University of Massachusetts Worcester

September 30, 2005

Analysis of House Bill 2663 and Senate Bill 1260 As Related to Nurse Staffing

Part II: Estimated Costs to Hospitals and Public Agencies and Impact on Nursing Workforce Development

Prepared at the suggestion of Harriette Chandler (D-Worcester) and upon the request of Senator Richard T. Moore (D-Uxbridge) and Representative Stephen Tobin (D-Quincy) by:

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Acknowledgements

The goal of this analysis is to promote a better and broader understanding of the issues surrounding nurse staffing as addressed in House Bill 2663 and Senate Bill 1260. We also attempt to highlight the policy implications of both bills to allow the Commonwealth of Massachusetts the best opportunity to make well-informed health policy decisions.

Many people contributed to this report by supplying information and/or helpful comments. In particular, we would like to acknowledge the members of the University of Massachusetts Worcester[1] workgroup who invested their time, insight, and expertise into this project. The views expressed in this report are based on research conducted by the project team working at the UMass Center for Health Policy and Research, and may not reflect the institutional views of University of Massachusetts Worcester or affiliates on the subject matter.

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[1] University of Massachusetts Worcester is one of five University of Massachusetts campuses. No present operation of University of Massachusetts Worcester will benefit from passage of either bill.

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Executive Summary

Background and Goals

Concerns about patient safety and quality of care due to insufficient registered nurse (RN) staffing have been raised in the last decade. These concerns have prompted a number of states to consider staffing standards by legislating minimum nurse-to-patient ratios.[2] Thus far, California is the only state that has actually enacted mandatory minimum ratios: Assembly Bill 394 was signed into law in 1999 and took effect in 2004.

Currently, the Massachusetts Legislature is debating the merits of House Bill 2663 and Senate Bill 1260, both relating to nurse staffing. The two bills are similar in their objectives: the improvement of patient safety, quality of care, and nurses' work environment by adding more direct care nurses to the bedside. However, the two bills propose different approaches. HB 2663 mandates specific minimum nurse-to-patient ratios, while SB 1260 requires hospitals to create nurse staffing plans based on patient acuity levels, nursing skill mix, and other hospital-specific operational variables.

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UMass has been requested to compare the likely policy and economic implications of the two bills. This analysis has been delivered in two parts. Part I of the report, released on August 31, 2005, accomplished the following:

- Summarized findings from the health care literature on three aspects of mandatory nurse-to-patient staffing ratios: 1) patient safety and quality of care, 2) cost to facilities and access to care, and 3) nursing labor market.
- Described and compared the two bills.
- Provided high-level policy implications with respect to benefits and risks associated with enactment of either HB 2663 or SB 1260.

[2] In the literature, nurse staffing is usually presented as nurse-to-patient ratios, such as 1:4 or 1:8. In this document, we follow this convention, and will sometimes refer to "higher" and "lower" nurse-to-patient ratios. These ratios may be thought of as fractions (i.e., 1/4 or 1/8). A nurse-to-patient ratio is "higher" if its numerical value is closer to 1. For example, a 1:4 ratio is greater than a 1:8 ratio, just as 1/4 (.25) is greater than 1/8 (.125).

Part II of the report, delivered here, does the following:

- Estimates the financial impact, in terms of additional registered nurse staffing costs, of HB 2663 on units within a sample group of hospitals.
- Estimates the potential costs of the monitoring and enforcement provisions of both bills to the Department of Public Health (DPH) and other public agencies.
- Analyzes the potential effectiveness of SB 1260 in terms of increasing the capacity of the nursing education system, which is critical to relieving the shortage of practicing hospital nurses.

In Part I of the report, we noted substantial evidence in the literature suggesting that higher nurse-to-patient ratios are associated with lower patient mortality rates, shorter inpatient lengths of stay, and fewer complications and medical errors, and that higher staffing levels may reduce strain on nurses' working conditions and improve their job satisfaction. However, the literature published to date has not provided a scientific basis for optimal nurse staffing ratios in specific types of hospital units. HB 2663 proposes a set of defined minimum nurse-to-patient ratios for various types of hospital units, while SB 1260 directs hospitals to establish nurse staffing plans, based on patient acuity, nursing skill mix, and other hospital and unit characteristics.

In this report (Part II), we estimate the costs, in terms of additional nurse staffing, that some units at a sample group of hospitals would incur under HB 2663. Because SB 1260 does not mandate specific staffing ratios, we cannot produce a similar estimate for that bill. We also estimate the costs of additional responsibilities that both bills would assign to public agencies within the Department of Public Health (DPH). Finally, we discuss SB 1260's provisions for supporting the nursing profession, and in particular the nursing education system, in Massachusetts, and assess the adequacy of these provisions. (HB 2663 does not address this area.)

Findings

Nurse Staffing Cost Impact:
To assess the impact of HB 2663 on hospital nurse staffing costs, we analyzed nurse staffing and patient utilization data from units for which data was available at a sample group of hospitals. We were unable to conduct a true random sample, but the sample group is broadly representative of the variety of hospital types and locations among Massachusetts hospitals. The methodology is described in detail in the main body of the report (pages 9-15). Briefly, the methodology involves comparing actual nurse staffing levels, from data provided by the sample hospitals, with the staffing levels that would have been required had HB 2663 been in effect during 2004 (the timeframe of the data).

As summarized in Table 1, the potential cost impact in terms of additional nurse staffing varied greatly by hospital type, and, to a lesser extent, by location. The nine hospitals in our sample group include three general acute care community hospitals (two suburban, one rural), three general acute care teaching hospitals (two in greater Boston, one outside of Boston), a state-owned (Department of Public Health) hospital, a free-

standing psychiatric hospital, and a rehabilitation hospital. We received data on nurse staffing levels and patient utilization in certain units for fiscal year 2004 from these hospitals, and compared the actual nurse-to-patient ratios to what would have been required had HB 2663 been in effect. The state hospital and the two specialty (psychiatric and rehabilitation) hospitals would have been strongly affected by the proposed minimum ratios. The two general acute care hospitals outside of the Boston metropolitan area would have felt a significant, but smaller, impact. The four acute care hospitals (both community and teaching) in Boston and its surrounding suburban areas would have felt the least impact from the proposed minimum ratios in fiscal 2004. These hospitals were already staffing above the proposed minimum ratios in a number of the units for which we received usable data. Table 1 summarizes the additional RN staffing costs HB 2663 would have imposed on specific units at the sample group hospitals.

Table 1: Summary of Estimated RN Payroll Costs to Sample Hospitals under HB 2663

Hospital	Hospital Type	Number of Units Analyzed	Units in Deficit	Increased Cost to RN Payroll	% Change in Total RN Payroll*
A	Suburban general acute care community	7	Psychiatric; Transitional Care	$1.2 million	+7.1%
B	Suburban general acute care community	8	Neonatal Intensive Care	$590,000	+4.1%
C	Boston-based general acute care teaching	7	Emergency Department; Psychiatric	$5.6 million	+2.7%
D	Boston-based general acute care teaching	8	Medical/Surgical; Transitional Care	$3.5 million	+5.7%
E	State-owned (DPH), providing acute care & other services	3	Medical/Surgical; Psychiatric	$15.9 million	+208%
F	Psychiatric	1	Psychiatric	$5.3 million	+157%
G	Rehabilitation	1	Rehabilitation	$3.9 million	+87%
H	General acute care teaching outside Boston area	8	Emergency Department; Medical/Surgical; Neonatal Intensive Care; Psychiatric	$17.4 million	+21.3%
I	General acute care community in rural western MA	3	Medical/Surgical; Psychiatric	$670,000	+17%

* As a percentage of total RN payroll in hospital units analyzed.

State Agency Costs:

Both HB 2663 and SB 1260 would impose new responsibilities, and therefore costs, on state agencies (within DPH). Based on estimates of personnel requirements provided to us by DPH, we calculate additional potential costs of up to $400,000 per year. While this amount is not large in the context of the state budget as a whole, it is important to note that neither bill creates a dedicated source of funding for these new responsibilities. SB 1260 stipulates that fines paid by hospitals for violations of its provisions would be

transferred to the Betsy Lehman Center, a part of DPH that would be given additional responsibilities under the bill. However, the bill does not specify the size of fines, or even mandate that monetary fines be levied.

Nursing Education and Workforce Development Impact:
SB 1260 would establish a $30 million Clara Barton Nursing Excellence Trust Fund to help support nursing students and faculty through scholarships, loan repayment assistance, and other programs. Drawing from a number of recent studies and reports, we find evidence that demand for nursing education is increasing, but that Massachusetts colleges of nursing are facing a faculty shortage. Thus, while the supply of prospective nursing students has increased in recent years, nursing schools are having to turn away qualified applicants. Unless the capacity of the nursing education system increases, the shortage of practicing hospital nurses will continue.

Conclusions

Both HB 2663 and SB 1260 share the goal of ensuring appropriate levels of hospital nurse staffing. The proposed methods of achieving this goal are quite different, however. The following are in our view the most important points about each bill that legislators and other policy makers should keep in mind as they debate the relative merits of the bills.

1. *Potential economic impact on hospitals of proposed minimum ratios*

Based on our analysis of nurse staffing data from our sample group of hospitals, we predict that the mandatory minimum nurse-to-patient ratios proposed by HB 2663 would have vastly different effects, depending on the type of facility, and (to a lesser extent) geographic location. In our view, two major factors account for this. First, HB 2663 does not take into account the variety of models of care delivery found in different health care disciplines. Psychiatric and rehabilitation hospitals, and such units within general hospitals, rely heavily on non-RN staff, such as mental health workers and physical therapists, and do not typically deliver the same level of care around-the-clock. As a result, both the proposed minimum ratios for these types of facilities (or units) and the requirement that staffing be uniform across all shifts are not consistent with current practice in these specialty areas.

A second major point is that HB 2663 does not primarily rely on patient acuity to drive nurse staffing decisions. While the bill would require hospitals to use an acuity-based PCS (developed under the supervision of the Department of Public Health, for use statewide), patient acuity measures could only be used to increase nurse staffing levels from the floor set by the minimum staffing ratios. These minimum ratios themselves are not based on measured patient acuity; indeed, as discussed in Part I of this report, the scientific literature has not identified any specific, optimal nurse-to-patient ratios. That patient acuity does not guide the proposed minimum ratios may help explain some of the regional variation in the hospital unit cost estimates: Boston-area general hospitals may have higher-acuity patients, on average, than hospitals in other areas of the state.

2. *Potential costs to public agencies*

Both bills would create new responsibilities for agencies within the Department of Public Health (DPH). While the costs of performing these new functions are not large in the context of the entire state budget, neither bill creates a dedicated funding source to pay for them.

3. *Impact on nursing education and workforce development*

The proposed minimum staffing ratios in HB 2663 would likely create significant new demand for RNs, but the bill has no provisions for alleviating the ongoing nursing shortage. SB 1260 does have a number of such provisions, including the establishment of a $30 million trust fund to support the nursing profession. However, this fund may not do enough to increase the capacity of the nursing education system by relieving the faculty shortage.

4. *Overall assessment*

In our view, HB 2663 would establish minimum nurse staffing ratios for specific clinical units that are not supported by existing research. The strongly differential effects the proposed minimum ratios would have on hospitals suggest that the proposed ratios do not adequately account for hospital-specific characteristics, such as model of care delivery, staff mix, and patient acuity. In addition, HB 2663 has no provisions on workforce issues, or on collecting data on nurse staffing and quality of care. SB 1260, in contrast, does not set specific nurse staffing ratios, but instead requires every hospital to establish a nurse staffing plan, based on patient acuity, nursing skill mix, and other hospital and unit characteristics. DPH will have responsibility for auditing these plans, and hospital compliance with them, on an ongoing basis. While the bill could lead to higher nurse staffing levels, there is no guarantee of this. SB 1260 does have provisions for data collection and for nursing education and workforce development, though the latter could be strengthened.

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Background and Goals

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- Analyzes the potential effectiveness of SB 1260 in terms of relieving bottlenecks in the nursing education system, which hinder nurse workforce development.

[3] In the literature, nurse staffing is usually presented as nurse-to-patient ratios, such as 1:4 or 1:8. In this document, we follow this convention, and will sometimes refer to “higher” and “lower” nurse-to-patient ratios. These ratios may be thought of as fractions (i.e., 1/4 or 1/8). A nurse-to-patient ratio is “higher” if its numerical value is closer to 1. For example, a 1:4 ratio is greater than a 1:8 ratio, just as 1/4 (.25) is greater than 1/8 (.125).

Potential Costs to Hospitals of Mandatory Staffing Ratios in HB 2663

We estimated the potential costs that a sample group of hospitals would incur in certain units under the proposed minimum nurse-to-patient ratios in HB 2663. While SB 1260 may also result in hospitals being legally obligated to hire additional nurses, depending on its interpretation and implementation should it become law, it does not mandate any specific staffing ratios. Consequently, we cannot produce an estimate of the potential costs under the Senate Bill.

Table 2 presents the minimum nurse-to-patient ratios HB 2663 would require hospitals to maintain.

Table 2: Nurse Staffing Ratios as Proposed in House Bill 2663

Hospital Unit	Nurse-to-Patient Ratio
Intensive Care	1:2
Critical Care	1:2
Neonatal Intensive Care	1:2
Burn	1:2
Step-down/Intermediate Care	1:3
Operating Room:	
RN as Circulator	1:1
RN as monitor in moderate sedation cases	2:1
Post Anesthesia Care:	
Under Anesthesia	1:1
Post Anesthesia	1:2
Emergency Department*	1:3*
Emergency Critical Care*	1:2*
Emergency Trauma*	1:1*
* The triage, radio, or other specialty registered nurse shall not be counted as part of this number.	
Labor and Delivery:	
Active Labor	1:1
Immediate Postpartum	1:2 (one couplet)
Postpartum	1:6 (three couplets)
Intermediate Care Nursery	1:4
Well-Baby Nursery	1:6
Pediatrics	1:4
Psychiatric	1:4
Medical and Surgical	1:4
Telemetry	1:4
Observational/Out Patient Treatment	1:4
Transitional Care	1:5
Rehabilitation	1:5
Specialty Care, any unit not otherwise listed above shall be considered a specialty care unit.	1:4

Methodology

As discussed previously, in Part I of this report, systematic state-wide data on nurse staffing by hospital unit are not presently available. We therefore obtained data directly from a sample group of nine Massachusetts hospitals. Because a true random sampling strategy was not feasible, given the short timeline of this project, two major factors drove the selection of hospitals: first, the desire to select a group of hospitals that broadly represents the range of hospital types, sizes, and locations (the characteristics of the sample hospitals will be discussed below), and second, availability to the research team of hospital contacts who could supply data promptly.

To estimate the cost to a specific hospital of hiring additional nurses to meet the minimum nurse-to-patient ratios proposed in HB 2663, we needed first to determine the actual staffing ratios, by unit, at that hospital. Then, we compared the actual staffing levels to the mandated levels, for those hospital units for which we could obtain data in the proper form. If actual staffing was below the proposed minimum ratio levels for a specific hospital unit, we then calculated the additional number of nursing hours the unit would have to add to make up the shortfall.[4] In some instances, particular hospital units were already staffing above the minimum levels proposed by HB 2663; we assume the bill would not impose any additional costs on such units.

While the basic calculations were straightforward, there were in practice a number of obstacles to confront. First, and foremost, was the lack of publicly available data on hospital nurse staffing broken out by hospital unit. The state's Division of Health Care Finance and Policy (DHCFP) routinely collects cost report data, which includes the number of nursing hours. Unfortunately, DHCFP does not provide unit-level data, which is necessary to analyze actual staffing levels by unit. Nor does their data separate staff time for direct patient care from time spent on other activities (administrative, etc.).

To overcome this limitation, we surveyed a sample group of hospitals, asking them to provide data on actual nurse staffing and patient utilization by hospital unit. Using the data provided, we constructed estimates of the potential costs to these hospitals of meeting the nurse-to-patient ratios contained in HB 2663. Our estimates, however, may not capture the full extent of added hospital costs, because the data we have collected from the sample hospitals does not match perfectly with the unit types listed in HB 2663. Although we sought to match actual staffing data to the listing of hospital units in the bill, we have not been able to achieve this for all units. As a result, the cost estimates we have produced (and will discuss later) refer only to certain units at our sample hospitals. They are not reliable estimates of the overall cost to an entire hospital, and they cannot be extended to estimate the potential costs to all hospitals in the state.

To calculate the actual nurse-to-patient staffing ratios for different units in these sample hospitals, we began with two core data elements supplied to us by the hospitals: patient days and registered nurse (RN) direct care hours in each unit. (We did not consider

[4] This basic methodology was drawn from both the University of California-San Francisco and the University of California-Davis studies, referenced in Part I of this report.

hours worked by other nurse categories, such as Licensed Practical Nurses [LPNs] or Nurse Practitioners [NPs], because only RNs are mentioned in HB 2663.) To get the standard nurse staffing measure of Hours Per Patient Day (HPPD), we divided direct care RN hours by the number of patient days:

$$HPPD = \frac{RNHours}{PatientDays}$$

HPPD could then be easily converted to a nurse-to-patient ratio, by performing the following calculation:

$$\frac{Nurse}{Patient} = \frac{HPPD}{24}$$

If the nurse-to-patient ratio in the hospital unit fell short of the HB 2663 requirements, we calculated the number of additional nurses required to retrospectively meet the ratios by first converting the mandated ratio to HPPD. Then we determined the additional number of nursing hours needed to meet the HPPD requirement for the given number of patient days. This number of extra nursing hours, multiplied by an hourly wage rate, yielded the cost (in nursing labor) of compliance with the HB 2663 ratios.

To illustrate, here is a step-by-step example, using hypothetical numbers:

Community Hospital, Medical-Surgical Unit

FY 2004 actual data: 4,000 patient days, 12,000 direct-care RN hours.
Proposed HB 2663 ratio for Medical/Surgical units = 1:4.

Step 1: Calculate actual nurse staffing ratio for unit.

$$\text{HPPD} = \frac{12000}{4000} = 3$$

Convert nursing HPPD to a nurse-to-patient ratio:

$$\frac{Nurse}{Patient} = \frac{HPPD}{24} = \frac{3}{24} = \frac{1}{8}$$

That is, 3 nursing hours per patient day is equivalent to a 1:8 nurse-to-patient ratio.

Step 2: Calculate nursing hours required by HB 2663 ratio.

Proposed HB 2663 ratio for Medical/Surgical units = 1:4.

Convert ratio to HPPD:

$$\frac{Nurse}{Patient} = \frac{HPPD}{24}$$

$$\frac{1}{4} = \frac{HPPD}{24}$$

$$(24)\frac{1}{4} = \frac{HPPD}{24}(24)$$

$$HPPD = \frac{24}{4} = 6$$

Thus, the required 1:4 ratio converts to 6 nursing hours per patient day.

Step 3: Calculate shortfall and estimate costs of compliance.

Required Nursing Hours = (Patient Days)(Required HPPD) = (4,000)(6) = 24,000
Actual Nursing Hours (from hospital) = 12,000
Additional Hours Needed = 24,000-12,000 = 12,000

In this hypothetical example, we see that a 1:4 nurse-to-patient ratio, mandated for a unit staffing at 1:8, would require the unit to double its nursing hours (and hence its nursing labor cost). We may then estimate the cost to the hospital of these additional nursing hours by multiplying the number of hours needed by the wage rate, after adjusting hours for non-working time and wages for the cost of fringe benefits.

For our example, we will use an hourly wage rate of $30. This corresponds very closely to reality: the federal Bureau of Labor Statistics (BLS) found that the average hourly wage of registered nurses in Massachusetts was $30.05, as of May, 2004.[5] Typically, non-productive time (i.e., vacation, holidays, and sick time) accounts for around 13-15% of total paid time. The number of additional nursing hours required must take this into account. Similarly, the cost of compensation includes employee benefits, and these generally add 25-30% to the employer's total compensation bill.

To calculate the total cost in our example, we will use the most conservative estimates within the above ranges as multipliers for non-productive time and benefits (13% and 25%, respectively).

$$Total\ Hours = (12{,}000)(1.13) = 13{,}560$$

[5] Data available at: http://stats.bls.gov/oes/current/oes_ma.htm#b29-0000. The average wage in Massachusetts is close to the 75th percentile of the national average of $30.46 (see http://stats.bls.gov/oes/current/oes291111.htm), indicating that hospitals in the state have higher than average costs.

$$\textit{Wage Rate w/Benefits} = (30)(1.25) = \$37.5$$
$$\textit{Total Compensation} = (13{,}560)(37.5) = \$508{,}500$$

The hypothetical hospital unit in our example would incur an additional total cost for wages and fringe benefits of $508,500 in order to comply with the mandated staffing ratios.

If desired, the number of additional hours needed may be converted to Full Time Equivalents (FTEs), or the number of nurses the hospital would need to hire to meet the requirement (assuming they have chosen to meet the requirement by hiring new staff, as opposed to using temporary agency nurses). To do this, simply divide the total hours needed (including non-productive time) by 2,080 hours (52 weeks at 40 hours per week).

$$FTE = \frac{13{,}560}{2{,}080} = 6.52$$

Data caveats and methodology limitations

Of course, the actual data will be considerably more complex than the simple example described above. A number of caveats and limitations concerning the data, and our analysis of it, should be kept in mind.

First, and most importantly, the data we obtained from our sample group of hospitals did not match perfectly with the list of unit types outlined in HB 2663. The general acute care hospitals in our sample were not able to provide us with the required data elements broken out by unit, for all units. We will note divergences between the actual data and the dataset that would have to be collected under HB 2663 in the text discussing each individual hospital. Two general points are worth noting here. First, because the actual hospital data reflected only some of the units, we could not determine the full impact of HB 2663 on the general hospitals in our sample; we were only able to evaluate those units for which we have the proper data. (We could, however, estimate the full impact for two specialty hospitals—one psychiatric and one rehabilitation facility—because these hospitals do not have separate units.) Second, the fact that some hospitals do not apparently have the capacity to report data on staffing at the level of detail required points to the retooling of hospital data systems that would need to take place should HB 2663 become law. HB 2663 would require hospitals statewide to adopt a uniform, acuity-based Patient Classification System (PCS), developed under the supervision of the Department of Public Health (DPH).[6] Conversion to this new system, which would take place within one year of the passage of HB 2663, will certainly impose costs on hospitals. At present, the hospitals in our sample group vary in their use of PCSs: some use sophisticated third-party software, others use internally developed systems, and

[6] While many hospitals, particularly larger ones, already have a PCS in place, the form of such systems is variable; thus hospitals would presumably have to abandon their current systems and switch to one developed under DPH supervision.

some use none at all. We lack sufficient information to estimate the costs to hospitals of implementing a standardized, statewide PCS.

A second limitation involves the two core data elements used in calculating the actual nurse-to-patient ratios maintained by the hospitals in our sample group: patient days and direct care nursing hours. For a number of reasons, both of these data elements may not be completely accurate. The figures for patient days come from each hospital's daily census, which is taken at the same time each day (generally midnight). The length of inpatient hospital stays varies greatly, however, and often involves partial days. Depending on the exact time of day patients are discharged, the length of stay measured in days might over- or understate the actual amount of time spent in the hospital. It is likely that these variations would cancel out, making the average daily census a valid estimate of the actual occupancy patterns, particularly in hospitals with large numbers of patients. However, this assumption has not been empirically validated, so the possibility that the actual lengths of patient days data may vary must be kept in mind.[7]

The measure of direct care registered nurse (RN) hours is also problematic for some hospitals. Not all hospitals are presently able to provide data at the required level of detail. Some are unable to separate direct care working hours from time spent performing other tasks (administrative, etc.), while others cannot even separate RN work hours from those of other personnel, such as Licensed Practical Nurses (LPNs), nursing assistants, or others. In the analyses that follow, we will note any such data issues for each hospital.

A third limitation of our methodology is that the cost to hospitals of additional nurse staffing is not limited to wages and benefits. Hiring new nurses is itself an expensive process: recent estimates of this cost have ranged from $23,000 to $50,000 per nurse, taking into account recruitment, training, and lower first-year productivity compared with experienced nurses.[8] Because we have no data on nurse replacement costs for the hospitals in our sample group, we will not consider these costs in our analysis. It is possible that such costs could be offset by reduced nursing staff turnover attributable to richer nurse staffing, but our analysis does not allow us to determine this.

A fourth caveat is that our analysis of the costs to hospitals does not take into account the possibility that nursing wages will rise as a result of HB 2663, should it become law. Basic economic theory suggests that the proposed minimum nurse staffing ratios would increase demand for nurses (assuming that most hospitals would have to hire more nurses to meet the ratios). This by itself would tend to raise the prevailing wage for nurses; considering also that nurses are a scarce resource, there is the potential for a

[7] Spetz J, Seago JA, Coffman JM, Rosendorf E, O'Neil E. Minimum Nurse Staffing Ratios in California Acute Care Hospitals. Center for the Health Professions, University of California, San Francisco. December 2000, p. 18.
[8] Rothberg MB, Abraham I, Lindenauer PK, Rose DN. Improving Nurse-to-Patient Staffing Ratios as a Cost Effective Safety Intervention. *Medical Care.* 2005; 43 (8): 785-91.

sharp spike in wage rates. However, an estimation of the magnitude of this effect is beyond our scope in this report.

A fifth limitation concerns potential cost offsets stemming from reduced complications and medical errors, and decreased patient length of stay. As noted in Part I of this report, there is considerable evidence that higher nurse staffing levels are associated with reductions in complications and adverse events, fewer medical errors, and shorter hospital stays. In theory, this has the potential to produce cost offsets, even overall cost savings, though it should be noted that such savings would accrue mainly to payers, rather than to hospitals. Some very recent research has begun to address this issue, but the findings so far are not conclusive. One analysis of the cost-effectiveness of increased nursing staffing estimated that the savings from better patient outcomes would only offset half of the increased nursing cost.[9] Another study, however, argues that the benefits of increasing nursing hours per inpatient day would lead to overall hospital cost savings.[10] Because research on quality of care, patient safety, and nursing cost offsets is at such an early stage, we will not address this issue in our analysis.

A sixth caveat concerning our methodology is that we assume nurses to be a non-transferable resource. That is, we assume that nurses cannot easily be reassigned to different hospital units from those in which they presently work. This assumption is critically important because some hospital units may exceed the proposed minimum nurse-to-patient ratios under HB 2663. In such instances, hospitals could, in theory, transfer nurses from those units that are staffing above the proposed minimum ratios to other units that are in deficit. There are, however, a number of reasons to doubt that this could be done in practice. It is unlikely, for example, that hospital administrators and nurse managers would wish to actually reduce nurse staffing in particular units, especially in hospitals where nurse staffing levels are already set by an acuity-based PCS. In addition, nursing skills have become increasingly specialized and unit-specific, making it more difficult to simply move nurses from one unit to another. Finally, work rules under collective bargaining agreements would also be likely to limit managers' ability to transfer nursing staff.[11]

Finally, the analyses of nurse staffing ratios we perform here do not take into account the patient acuity mix, or the skills of individual nurses (beyond the fact that they are licensed registered nurses), in the sample hospital units we examine. HB 2663 would require hospitals to use an acuity-based patient classification system (PCS) in their nurse staffing planning. SB 1260 would require hospitals to use written staffing plans; Section 6 of the bill makes it clear that such plans must be based in part on patient

[9] Ibid., p. 788.
[10] Dall TM, Chen YJ, Hogan PF, Maddox PJ. "RN Staffing and Quality of Care in Acute Care Hospitals: Partial Estimates of the Economic Value of Professional Nursing." Presentation at AcademyHealth Annual Research Meeting, June 2005.
[11] In addition to assuming non-transferability between hospital units, we assume non-transferability between working shifts. This is important because HB 2663's proposed minimum ratios would apply around the clock. Because the nurse staffing data we analyzed is aggregated, we cannot determine staffing patterns by shift. Units that overall are staffed at or beyond the proposed minimum ratios, according to our analysis, may in fact be in deficit on overnight shifts, if patients have relatively low acuity.

acuity, though that term is not specifically used. An analysis of either bill's specific requirements for nurse staffing planning is beyond our scope in this report. It is important to keep in mind that the staffing ratios mandated by HB 2663 for which we are estimating hospital costs represent only the *minimum* staffing levels hospitals must maintain at all time. Should hospital PCSs indicate the need for additional nurse staffing beyond the minimum ratios, hospitals must staff to these higher levels. Many hospitals already use an acuity-based PCS to develop their nurse staffing plans, and, as will be seen in the analysis that follows, a large proportion of the individual hospital units in our hospital sample group already staff beyond the minimum ratios proposed in HB 2663.

Characteristics of sample group hospitals

Our sample group consists of nine hospitals. While not a true random sample, the group is broadly representative of the diverse characteristics of the Massachusetts hospital industry. The sample group includes three general acute care community hospitals (two suburban, one rural), three general acute care teaching hospitals (two in greater Boston, one outside of Boston), a state-owned (Department of Public Health) hospital, a free-standing psychiatric hospital, and a rehabilitation hospital.

Estimated costs of HB 2663 compliance for sample hospital units

In this section, we will compare actual nurse staffing levels at our sample group hospitals with the staffing levels that would have been required, had the proposed minimum nurse-to-patient ratios under HB 2663 been in effect at the time. The data analyzed here is from fiscal year 2004. As discussed above, we will do this analysis only for those hospital units for which we have data at the necessary level of detail. Thus, what follows is not an estimate of the overall cost to the hospitals; we cannot reliably extrapolate from our subsets of hospital units to entire hospitals. By extension, we obviously cannot extrapolate from our sample group of hospitals to the population of hospitals statewide.

The hospitals in our sample group participated in this project on the understanding that their identities would be kept confidential. Therefore, we are limited in the level of detail that we can give in the discussion that follows. We will only give generic identifying information as to the type, relative size, and general location of the acute care community hospitals in the group. For hospitals in the other categories (psychiatric, specialty, and state facility), we will provide no identifying information at all, beyond the category type, because of the small number of facilities of each type in the state. In terms of the nurse staffing data, we will not present any numerical data concerning the number of patient days or nursing hours, as such information could be used to identify the hospital. Instead, we will present only aggregated data, such as percentage differences between actual nurse staffing ratios and those that would be needed under the proposed minimums. We will present some numerical data on additional costs, but these will be aggregated across all units for which we have data.

Hospital A

Hospital A is a general acute care community hospital located in a suburban area. The hospital was able to supply us with sufficient data to calculate its actual nurse staffing ratios for seven units: Intensive Care, Maternity (postpartum), Medical/Surgical, Pediatrics, Psychiatric, Specialty Care, and Transitional Care. Hospital A presently uses an acuity-based Patient Classification System (PCS) to help determine its nurse staffing needs.

Hospital A retrospectively exceeded the proposed minimum nurse-to-patient ratios on five of these seven units. The total variance in nursing hours on these five units was 15.2% above the minimum proposed staffing levels under HB 2663. The two units that did not meet the ratios, Psychiatric and Transitional Care, fell well short of the requirements; these two units combined would have needed to increase their registered nurse (RN) staffing by 47.3% to meet the mandated minimum ratios. The Psychiatric unit showed a far greater variance in staffing relative to the proposed minimum ratio of 1 nurse to 4 patients: to meet this requirement, nurse staffing in the Psychiatric unit would have had to be increased by 67.8%.[12] The corresponding figure for the Transitional Care unit is only 17.4%.

Hospital A provides an excellent example of the consequences of our assumption that nursing staff are non-transferable. While the Psychiatric and Transitional Care units would have fallen short of the HB 2663 ratios, if these two units are grouped with the other five units for which we have data, the seven units as a whole would have exceeded the total number of proposed minimum RN hours by 4.5%. But since we are assuming nurse non-transferability, our analysis regards Hospital A as having a nursing deficit in its Psychiatric and Transitional Care units.

Based on average wage data supplied to us by the hospital, we estimate that the total cost (including fringe benefits and non-productive time multipliers of 25% and 13%, respectively) of the additional registered nurse staffing hours required to have met the HB 2663 proposed minimums in these two units would have been just over $1 million. This would represent a roughly 7.1% increase in Hospital A's total RN payroll for the seven units we analyzed here. In addition, Hospital A would have needed to hire full-time RNs to fill two of the three dedicated nursing management positions specified by HB 2663. Assuming compensation for these two positions at the average RN wage rate for all seven units,[13] this would add approximately $178,000 to the total additional cost. Because we do not have data for all hospital units, we cannot estimate the proportional share of this extra cost that we would attribute to the seven units analyzed here. For this

[12] For a number of reasons, psychiatric units are likely to have substantially lower nurse-to-patient ratios than the proposed minimum. These reasons will be discussed below, in the section for Hospital E, which is a freestanding psychiatric facility.

[13] We make this assumption because we lack salary data on nursing management positions. It is fairly likely that compensation for these positions would be higher than for direct care positions, but, as with other assumptions we make in this analysis, we wish to err on the side of under- rather than over-estimation of costs to hospitals.

reason, we did not recalculate the percentage increase in nursing payroll to include the cost of the nursing management positions for this hospital.

To gauge the impact this additional expense would have had on Hospital A's financial bottom line, we obtained the hospital's financial statement for 2004 from the Department of Health Care Finance and Policy (DHCPF) website. We then subtracted the total estimated additional cost of nursing staff from the hospital's operating margin (expressed as a dollar amount). The additional cost would have reduced Hospital A's operating surplus by approximately 25.7%.

According to our analysis, Hospital A would have experienced a substantial financial impact from HB 2663 in terms of additional nurse staffing required to meet the bill's mandatory nurse-to-patient ratios. This impact is concentrated, however, in the Psychiatric and Transitional Care units, and in the dedicated nursing management positions. While Hospital A overall appeared to be in relatively good financial health in 2004, the nurse staffing mandates would have substantially cut into the hospital's positive operating margin for the year. It is critical to note, however, that if we drop the assumption of nurse non-transferability, the impact in terms of direct care nurse staffing would disappear completely. If we extend the concept of transferability to include shifting nurses from direct care to management duties, then Hospital A could in fact have fulfilled HB 2663's nursing management requirements as well, without hiring additional staff. For all the reasons discussed above, however, we do not expect hospitals to make up nursing shortfalls through transfer or re-assignment of staff. Moreover, since Hospital A uses an acuity-based PCS in developing its nurse staffing plans, we assume that any unit nurse staffing ratios that exceed the proposed minimums do not in any way represent "overstaffing," but rather are appropriate for the prevailing acuity mix of the hospital.

Hospital B

Hospital B is also a general acute care community hospital located in a suburban area. The hospital was able to give us data on the following eight units: Ambulatory Surgery,[14] Critical Care, Emergency Department,[15] Medical/Surgical, Neonatal Intensive Care, Operating Room,[16] Pediatrics, and Telemetry. Hospital B does not currently use an acuity-based PCS for nurse staffing planning.

[14] HB 2663 does not specify a minimum nurse staffing ratio for an Ambulatory Surgery unit. It seems likely that the ratio required would be 1:1, since that is the requirement for circulating nurses in an operating room. We therefore use 1:1 in our analysis of this unit.

[15] HB 2663 has three different ratios under the broader category of Emergency Department. In the bill's text, a 1:3 nurse-to-patient ratio is listed as applying to the ED as a whole (exclusive of triage, radio, and other specialty nurses), but two subcategories require higher staffing: Emergency Critical Care has a proposed 1:2 ratio, while Emergency Trauma requires 1:1 staffing. Since without data on patient mix we cannot determine which ratio should apply to ED staffing data, we use the intermediate 1:2 ratio in our analysis. In the case of Hospital B, using the higher 1:1 ratio would have placed the ED in substantial deficit.

[16] HB 2663 proposes ratios for two different subcategories among the more general Operating Room heading: RN as Circulator, with a 1:1 ratio, and RN as Monitor in Moderate Sedation Cases, with a 2:1 ratio (i.e. two nurses for each patient). To be conservative, we will use the lower 1:1 ratio in the overall

Hospital B exceeded the proposed minimum nurse staffing ratios in seven of these eight units, with a variance of nursing hours that was 28.5% above the required total for those seven units. The unit that would have failed to meet the proposed requirements had they been in effect was Neonatal Intensive Care, though it should be noted that Hospital B combines Neonatal Intensive and well-baby care into one nursery area. For the purposes of this analysis, however, we assume that the proposed 1:2 ratio would apply to this unit, since it is the site of care for higher-acuity (intensive care) babies. This unit would have needed almost twice as many nursing hours—an increase of about 92.1%—to have met the 1:2 ratio. As with Hospital A, this nurse staffing deficit could in theory be erased by transferring staffing from units that are staffed above the proposed minimum ratios, but we assume no such transfers would be possible.

Making up the nursing deficit in the Neonatal Intensive Care Unit would have required a nearly $590,000 increase in total RN payroll for that unit. This would represent approximately a 4.1% increase in total RN payroll for the eight units analyzed here. The hospital already has the required three full-time RN management positions proposed in HB 2663 filled, so no additional expense would have been incurred. In terms of the impact on the hospital's overall financial health, the additional nurse compensation would have reduced the hospital's operating surplus by about 13.1%.

Based on the units for which we have data, our analysis shows that Hospital B would have felt a definite financial impact had the HB 2663 ratios been in effect, though at a lower magnitude than Hospital A, the other suburban community hospital in our sample group. The nursing shortfall in Hospital B was entirely in one unit, Neonatal Intensive Care. This type of unit requires highly specialized nurses, so closing the nursing gap there would have required considerable effort, if the entire unit were to meet the 1:2 ratio. (It is unclear, however, whether that ratio would actually apply to the unit, since it includes lower-acuity well-baby care.) While the ratio requirements would not have pushed Hospital B into financial deficit, they would have reduced its financial surplus.

Hospital C

Hospital C is the first of two Boston-based general acute care teaching hospitals in our sample group. This hospital gave us data on the following seven units: Emergency Department, Intensive Care, Medical/Surgical, Neonatal Intensive Care, Operating Room, Pediatrics, and Psychiatric. Hospital C does use an acuity-based PCS in developing its nurse staffing plans.

Hospital C exceeded the proposed minimum ratio requirements in five of these seven units, with the nursing hours variance (surplus) equal to 30.3% of the required amount for those five units.[17] The two units with a nursing shortfall were the Psychiatric unit and

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cost analysis for the three hospitals in our sample group that reported OR usable staffing data. Each of the three, however, has actual staffing ratios higher than 2:1 (i.e. greater staffing).

[17] As with Hospital B, we measure Hospital C's Operating Room staffing against the lower 1:1 ratio for RNs as Circulators, even though the hospital staffed its OR above the higher 2:1 ratio required for moderate sedation cases.

the Emergency Department (ED). The Psychiatric unit would have needed a 22.3% increase in RN hours, while the ED would have required a very substantial 48.4% increase. The nursing surpluses in the other five units are larger than the deficits in these two units, as was true of the previous two hospitals in our sample.

To remedy the ED and Psychiatric unit nursing shortfalls, Hospital C would have needed to increase its RN budget in these units by about $5.6 million, or 2.7% of the total RN budget for the seven units for which we received data.[18] All three of the required nursing management positions are already staffed by RNs, so the additional expense would have been only in direct care. These costs would have reduced the hospital's operating surplus by 9.4%.

Most of the financial impact on Hospital C from the HB 2663 nurse staffing ratios would have been attributable to the nursing shortfall in the Emergency Department. The nursing shortfall in the ED accounted for over 92% of the total shortfall (with the lower-volume Psychiatric unit accounting for the other 8%). In fact, our analysis may understate the extent to which the ED at Hospital C would have fallen short of the proposed minimum nurse staffing ratio: as discussed above, HB 2663 has three different requirements, depending on the level of care provided, and we have measured the ED nurse staffing against the intermediate standard of 1 nurse for each 2 patients, the standard for critical care patients. The proposed requirement for trauma patients is 1:1. While we do not have data on patient mix, we assume that some percentage of Hospital C's emergency patients fall into the trauma category. The higher this percentage, the further Hospital C would fall into a deficit of nursing hours. It is not surprising that an ED in an urban teaching hospital would experience nurse staffing shortages.

Hospital D

Hospital D is the other Boston-based general acute care teaching hospital in our sample group. This hospital was able to supply data on the following eight units: Adult Intensive Care, Medical/Surgical, Neonatal Intensive Care, Pediatrics, Pediatric Intensive Care, Rehabilitation, Telemetry, and Transitional Care. Hospital D uses an acuity-based PCS in developing its nurse staffing plans.

Hospital D exceeded the proposed minimum ratios in six of the eight units, with a nurse staffing variance (surplus) for these six units of 27.3%. The two units that would not have met the nurse staffing ratios were Medical/Surgical and Transitional Care. The Medical/Surgical unit would have needed 13.8% more RN hours, while the Transitional Care unit would have required a much larger 44% increase. As with the previous hospitals, the total deficit in these two units was smaller than the total surplus in the other six.

[18] The data on nurse wages we received from Hospital C showed implausibly high hourly wages, so we use $35 per hour as an average wage rate for the hospital. We have chosen this figure, as opposed to the lower statewide RN average wage of $30, because of the hospital's Boston location, which presumably results in higher nurse compensation.

Hospital D would have had to increase its RN payroll in its Medical/Surgical and Transitional Care units by roughly $3.5 million, or about 5.7% of the total RN payroll in the eight units analyzed here. The hospital already has the three nursing management positions filled, so costs would have been confined to direct care staff. The additional expense would have reduced Hospital D's operating surplus by approximately 23.7%.

The proposed minimum nurse staffing ratios in HB 2663 would have a substantial economic impact on Hospital D. In fact, it is likely that the effect would be considerably stronger than our estimate. Hospital D was unable to give us data on its Emergency Department in the form needed for our analysis, so it was not part of the cost estimate. Hospital D has a number of similarities to Hospital C, for which we were able to calculate the ED nursing shortfall. That shortfall was quite substantial. We expect that, had we been able to include the ED in the analysis of Hospital D, the overall nursing shortfall, and the cost of making it up, would have risen considerably.

Hospital E

Hospital E is a state-owned (Department of Public Health) hospital that provides a variety of acute care and other services. Because there are only a few such hospitals, we will not provide any further identifying information. This hospital was able to give us data at the needed level of detail for three units: Intensive Care, Psychiatric, and Medical/Surgical. The hospital does use an acuity-based PCS to assist in nurse planning.

Hospital E had a very serious nursing shortfall in two of these three units, as compared with the proposed minimum ratios in HB 2663. The Intensive Care unit did have a nurse staffing variance of 55% above the proposed requirement; this likely reflects high patient acuity. The other two units were well below the proposed staffing requirements. The Psychiatric unit would have needed a 275% increase in RN staffing to have met the proposed ratio, while Medical/Surgical would have required a 200% increase. In contrast to the other general acute care hospitals in our sample group, the upward variance (surplus) in nurse staffing observed in certain units (in this case, Intensive Care) is far smaller than the total shortfall in the remaining units.

We did not receive any financial data from Hospital E, so our estimate of the potential financial impact of HB 2663 is necessarily limited. Using $30 per hour as a default wage rate, we calculated that the additional cost would have been just under $15.9 million; the added cost would have more than tripled the total RN payroll in the three units for which we obtained data.[19] (The hospital does have all three of the nursing managers in place.) Since Hospital E is a state hospital, these funds would have had to be obtained from general tax revenues. The analysis presented here suggests that state hospitals might

[19] Since we did not receive any financial or wage data from Hospital E, we estimated both the observed 2004 RN payroll and the additional expense that would have been needed under HB 2663 using $30 as the average hourly base wage rate. Regardless of the actual wage rate, the ratio of additional wage expense to actual wage expense will be the same as the ratio of additional RN hours to actual RN hours.

be impacted to a greater degree by HB 2663's proposed requirements than other hospital types; further research on this issue should be done.

Hospital F

Hospital F is a free-standing psychiatric hospital. Because of the small number of facilities of this type in Massachusetts, we will give no further identifying information. The hospital does not use an acuity-based patient classification system.

In contrast to the general acute care hospitals in our sample group, we can in fact estimate the economic impact of HB 2663 on Hospital F as a whole, since all of its data fall under a single category. The hospital's data reveal that they are far short of meeting the proposed RN ratio requirement: they would have needed to increase their nurse staffing by 148.5% to have met the proposed minimums. The cost of increasing RN staffing by nearly 2.5 times their actual levels would have been catastrophic for Hospital F: almost $5 million, also a 148.5% increase from the actual RN payroll level. In addition, the hospital would need to fill all three of the full-time nursing management positions, further raising the costs to nearly $5.3 million, or a 157% increase.[20] We could not obtain information on this hospital's operating margin, but we assume that this extra expense would have pushed the hospital very far into financial deficit.

It is not surprising that Hospital F would be so far in deficit with respect to HB 2663's proposed minimum ratios. Psychiatric hospitals have an entirely different model of care than do general acute care hospitals. To begin with, psychiatric inpatients generally follow a schedule more like that of the general population, with daytime spent in organized activity, and the night spent asleep. While there is certainly the potential for patients to need care during the night, in general staffing for the overnight shift is expected to be much leaner. Furthermore, the treatment modalities typically used in inpatient psychiatric care call for a different skill mix than in physical care settings, with a greater emphasis on mental health workers, social workers, and other professionals outside the MD and RN categories.

While the potential economic impact of HB 2663 on the general acute care hospitals in our sample group would be substantial, the impact on Hospital F would likely be devastating. Were this hospital required to meet the proposed 1:4 nurse-to-patient ratio, and to meet this ratio 24 hours a day, it is difficult to imagine a way that the hospital could continue to operate in the current environment of relatively low reimbursements for behavioral health services.

Hospital G

Hospital G is a rehabilitation hospital. Because there are a limited number of such facilities in Massachusetts, we will not give any further identifying information about the facility. The hospital does not presently use an acuity-based PCS.

[20] Because this hospital is not divided into separate units, we include the cost of the nursing management positions in the overall estimate.

A serious limitation of Hospital G's nurse staffing data is that they were unable to separate RNs from licensed practical nurses (LPNs). As a result, our analysis uses the combined total of RNs and LPNs to calculate the hospital's actual nurse staffing ratios. Since HB 2663's proposed minimums refer only to RN staffing, our analysis underestimates the potential financial impact on Hospital G.

As with Hospital F, we are able to produce a cost estimate for Hospital G as a whole (with the caveat noted in the previous paragraph), since all of the hospital's functions fall under the rehabilitation category. Hospital G also fell well short of the proposed minimum nurse staffing ratios. The hospital would have needed roughly 86% more RNs to have met the 1:5 nurse-to-patient ratio proposed for rehabilitation units or hospitals. Since our analysis treats the hospital as a single unit, the cost increase is the same, about 86% of actual RN payroll, or over $3.9 million.[21] The true cost would have been higher yet, because of the RN/LPN issue referenced above. We do not have information on Hospital G's operating margin, but, as with Hospital F, we assume that the impact on overall financial health would have been quite serious.

The very substantial deficit in nursing hours at Hospital G is explained by differences in the model of care delivery at rehabilitation facilities. As was the case with Hospital F (the psychiatric hospital), Hospital G has greatly reduced staffing needs for the overnight shift, as rehabilitation activities take place during the day and evening hours only. In addition, Hospital G uses a different mix of personnel, including physical therapists and personal care attendants; nurses are used less than in a traditional acute care hospital setting.

Like Hospital F, Hospital G would experience a very serious financial impact from the proposed minimum RN staffing ratios in HB 2663. While we lack complete financial information for Hospital G, it seems likely that the proposed nurse staffing ratio for rehabilitation would cast its financial viability into doubt.

Hospital H

Hospital H is a general acute care teaching hospital, outside of the Boston metropolitan area. This hospital was able to provide data on the following eight units: Emergency Department, Intensive Care, Medical/Surgical, Neonatal Intensive Care, Operating Room, Pediatrics, Psychiatric, and Specialty Care. Hospital H does not use an acuity-based PCS to help determine nurse staffing.

Hospital H exceeded the proposed minimum ratio requirements in four of the eight units analyzed here: Intensive Care, Operating Room, Pediatrics, and Specialty Care. The total surplus nursing variance was about 43.7% of the required amount in these four

[21] Hospital G would also need to increase its nursing management staffing by 0.5 FTE in order to completely satisfy the proposed requirement for 3 full-time RNs in this category. This would raise the total cost estimate only marginally, to 87% of actual payroll. As with Hospital F, we will include this cost in the final estimate, since we have data for the entire facility.

units.[22] The remaining four units would all have fallen short of the proposed minimum ratios had they been in effect.

The Psychiatric unit would have had the greatest shortfall, requiring a 111.4% increase (i.e., more than double the actual RN staffing would have been needed). Two other units, ED and Medical/Surgical, had greater shortfalls in actual nursing hours, though the percentage increases needed to have met the proposed ratios were lower: roughly 50.8%[23] and 23.6%, respectively. The Neonatal Intensive Care Unit would have needed 26.9% more RN hours. Unlike some of the other general acute care hospitals in our sample group, the upward variance (surplus) observed in some units at Hospital H was smaller than the deficit in others.

The cost of making up the nursing deficits in the Psychiatric, ED, Medical/Surgical, and Neonatal Intensive Care units would have been over $17.3 million, or about 21.3% of the total RN budget for the eight units analyzed here. The hospital would also have needed to hire one of the three nursing management positions, at a cost of slightly over $97,000. Hospital H had a positive operating margin in fiscal year 2004, but the additional costs would have eliminated its operating surplus, leaving a slight negative operating margin instead.

The nurse staffing patterns observed at Hospital H are similar to those of other members of our sample group. The Psychiatric unit has less than half the RN staffing required under HB 2663; as noted in the discussion of the free-standing psychiatric hospital (Hospital F), the around-the-clock, 1:4 ratio proposed in the bill does not take into account the unique model of care in this discipline. Similar to some other hospitals in the sample group, Hospital H has substantial nursing deficits in the ED and Medical/Surgical units.

Hospital I

Hospital I is a general acute care community hospital located in a rural part of western Massachusetts. This hospital was able to provide data on the following three units: Intensive Care/Critical Care, Medical/Surgical, and Psychiatric. Hospital I uses an acuity-based PCS to help determine nurse staffing.

One of the three units, the combined Intensive Care/Critical Care unit, would have exceeded the proposed minimum nurse-to-patient ratio of 1:2, had it been in effect, by around 44.4%. The other two units would have fallen short of the proposed minimums. The Medical/Surgical and Psychiatric units would have needed 28.5% and 11.4% more RN hours, respectively, to have met the requirements. The upward variance of nurse

[22] As with Hospitals B and C, we use 1:1 as the required ratio for the Operating Room, though Hospital H, like the other two, actually staffed its OR above a 2:1 nurse-to-patient ratio.
[23] Again following Hospitals B and C, we use the intermediate 1:2 ratio as the benchmark for ED staffing. If the higher 1:1 ratio were used, Hospital H would have needed a more than 200% increase in RN staffing for the unit.

staffing in the Intensive Care/Critical Care unit was less than half the size of the deficit in the other two units.

Hospital I has some unique data reporting particularities that cause an understatement of the actual nursing shortfall. The three units analyzed here care for a significant number of shorter-term patients, in addition to the inpatients counted in the daily census of these units. For example, the beds in the Intensive Care/Critical Care and Medical/Surgical units are also used for observation, recovery room, and surgical day patients; the Psychiatric devotes some of its beds to partial hospitalization patients.[24] In a larger hospital, beds used for these purposes would likely be counted as separate units, but in this small, rural hospital, the categories are lumped together. As a result, the daily inpatient census on these units significantly understates actual patient utilization, and, therefore, required levels of nurse staffing under HB 2663.

In financial terms, it would have cost Hospital I almost $460,000 to remedy the nursing shortfall (irrespective of any patient undercount) in its Medical/Surgical and Psychiatric units. This represents approximately 17% of its RN payroll in the three units analyzed. The hospital had a negative operating margin in fiscal year 2004, and the additional cost would have increased this financial deficit by about 43.3%. In addition, Hospital I would have needed to hire all three of the nursing management positions required by HB 2663, at an additional cost of over $210,000. Combining this with the additional direct care nursing costs would have increased the hospital's operating deficit by 63.4% overall.

The proposed minimum nurse-to-patient ratios would have had a substantial, negative financial impact on this small, rural hospital. In fact, the additional nursing costs required on the units we analyzed would have been higher than our estimate, because of the issue with reporting patient days referenced above. Further, the effect might have been stronger still had we been able to include the Emergency Department in the analysis, but we could not do so because data for that unit was not available at the level of detail needed to conduct the analysis.

Summary of hospital cost estimates

In this section, we have attempted to estimate the potential costs of HB 2663 on a sample group of nine Massachusetts hospitals. It is important to remember that the cost estimates presented here are not comprehensive, because we could not estimate costs for all units at our sample group hospitals. While we believe that our sample group represents well the diversity of hospitals statewide, the findings from this analysis cannot serve as a statistical estimate of the potential costs for the population of all hospitals in the Commonwealth. Our analysis here only estimates the costs certain hospitals would have incurred, in certain units for which data was available in the form needed, had the minimum nurse-to-patient ratios proposed in HB 2663 been in effect during these hospitals' 2004 fiscal years.

[24] Nursing Administrator at Hospital I, personal communication with UMass research team.

Table 3 summarizes the hospital unit cost estimates for the nine sample group hospitals. Further discussion of these estimates will be presented in the section on policy implications, at the end of this report.

Table 3: Summary of Estimated RN Payroll Costs to Sample Hospitals under HB 2663

Hospital	Hospital Type	Number of Units Analyzed	Units in Deficit	Increased Cost to RN Payroll[a]	% Change in Total RN Payroll[b]
A	Suburban general acute care community	7	Psychiatric; Transitional Care	$1.2 million	+7.1%*
B	Suburban general acute care community	8	Neonatal Intensive Care	$590,000	+4.1%
C	Boston-based general acute care teaching	7	Emergency Department; Psychiatric	$5.6 million	+2.7%
D	Boston-based general acute care teaching	8	Medical/Surgical; Transitional Care	$3.5 million	+5.7%
E	State-owned (DPH), providing acute care & other services	3	Medical/Surgical; Psychiatric	$15.9 million	+208%
F	Psychiatric	1	Psychiatric	$5.3 million	+157%
G	Rehabilitation	1	Rehabilitation	$3.9 million	+87%
H	General acute care teaching outside Boston area	8	Emergency Department; Medical/Surgical; Neonatal Intensive Care; Psychiatric	$17.4 million	+21.3%*
I	General acute care community in rural western MA	3	Medical/Surgical; Psychiatric	$670,000	+17%*

Source: Unit-level nurse staffing and patient utilization data provided by hospitals.
[a]Costs are only for units for which we received data; total dollar figures include nursing management positions.
[b]As a percentage of total RN payroll in hospital units analyzed.
*Percentage does not include nursing management positions.

Potential Costs to Public Agencies of Monitoring and Enforcement Provisions in Both Bills

Both HB 2663 and SB 1260 direct public agencies to engage in monitoring and enforcement activities.[25] These activities will require dedicated resources, and hence have a quantifiable cost, which ultimately falls on the public. Neither bill provides dedicated sources of funding to cover required actions by the Department of Public Health (DPH),[26] although SB 1260 does identify a potential (though not assured) funding source.

This section will estimate the costs to public agencies of both bills. For this analysis, we rely principally upon work done internally by analysts at the Department of Public Health, in which they estimate the type and number of personnel that would be required to perform the functions required by each bill. Paul Dreyer, Director of the Division of Health Care Quality at DPH, has shared these internal estimates with us, and we report them here.[27] We will also attempt to quantify the resulting personnel costs (which DPH has not done).

All of the required state government actions under HB 2663, and some of those under SB 1260, would be performed by personnel at DPH's Division of Health Care Quality (DHCQ). SB 1260 also requires action by the Lehman Center, which is also part of DPH. In this analysis, we focus our attention solely on the monitoring and enforcement actions required under the two bills.

SB 1260 also calls for several one-time reports or plans to be prepared, dealing with various aspects of nursing workforce and faculty development. The offices or agencies responsible for these various reports include the Executive Office of Health and Human Services, the Executive Office for Administration and Finance, the Executive Office of Economic Development, the Board of Higher Education, the Department of Labor and Workforce Development, the Board of Registration in Nursing, and the Massachusetts Center for Nursing, Inc. While we will not attempt to estimate costs for these one-time expenses, they are worth noting.

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[25] In addition, SB 1260 would make the Massachusetts Center for Nursing (MCN), a non-profit organization founded in 2002 and intended to promote the nursing profession in Massachusetts, the state's data repository regarding the supply and demand of health care workers in the Commonwealth. In Part I of this report, released on August 31, 2005, we incorrectly stated that the MCN was already serving as the repository for this data, and that the MCN was associated with Worcester State College. The MCN is not presently the state's nursing data repository, and is an independent non-profit organization unaffiliated with Worcester State College. We apologize for both errors.

[26] This section refers only to administrative actions required of DPH in its role as the state's hospital regulatory agency. Costs related to increased nurse staffing at DPH hospitals are not considered here.

[27] Paul Dreyer is also the Executive Office of Health and Human Services appointee to the Special Committee on Nursing Workforce Issues, which requested that UMass produce this report.

Costs under HB 2663

DPH provided us with the following estimate of personnel requirements associated with compliance monitoring and enforcement of HB 2663, from which we will quote directly:

> HB 2663 requires the Department to:
>
> 1. Develop a standardized acuity-based patient classification system to be used by all hospitals
> 2. Receive from each hospital annual staffing plans based on the classification system
> 3. Receive from each hospital an audit of the previous year's staffing plan
> 4. Promulgate regulations governing the development and implementation of the standardized acuity-based patient classification system
> 5. Take enforcement action against facilities that fail to anticipate, design, maintain, or adhere to a daily written nurse staffing plan, including the imposition of up to a $25,000 fine
> 6. Maintain hotline for consumer reporting of violations
> 7. Investigate consumer reports of violations within 24 hours of receipt
> 8. Post violation notices on its web site for 60 consecutive days.
>
> These steps require the following resources:
>
> 1. Program manager to oversee the implementation (M VI level)
> 2. 2 Research analysts to develop the acuity based system and analyze annual audit submissions to verify compliance
> 3. 1 FTE clerical support to enter data and to receive and file plans
> 4. Lawyer to write implementation regulations
> 5. IT support to build a database of hospital plans and audits and to build the web based violation notice system
> 6. 3 RN investigators to provide 24 hour response to complaints.[28]

Of the six types of personnel listed above, it seems plausible that positions in numbers 1, 2, 3, and 6 would need to be ongoing, permanent positions, while those in numbers 4 and 5 would be temporary (i.e., required for start-up only). Because it is unclear what length of time would be required to write implementation regulations (number 4) and build the database and web based violation notice system (number 5), we will not attempt to estimate the costs of these temporary positions, which could potentially be performed by current staff. We will estimate only the costs of the remaining, presumably permanent, new staff positions.

We received information from the state's Human Resources Division (HRD) estimating the likely salaries of permanent employees in the job categories listed in the DPH document. DPH would need 7 personnel FTEs to fulfill on going tasks relating to HB 2663. The job categories needed, and their expected starting salaries according to

[28] Internal DPH document provided to UMass by Paul Dreyer, Director, Division of Health Care Quality.

HRD, are as follows: 1 Program Manager ($57,400), 2 Research Analysts ($39,500 each), 1 Clerical Support ($35,000), and 3 Registered Nurses ($46,500 each). To account for the cost of employee benefits, we will add 25% for each position. Based on these figures, we estimate that the cost to DPH of monitoring and enforcing hospital compliance with HB 2663 would be $388,625 per year,[29] in addition to start-up costs. HB 2663 does not provide any funding source to cover these costs.

Costs under SB 1260

DPH's involvement in monitoring and enforcement under SB 1260 can be broken down into two components: direct compliance monitoring by DHCQ, and indirect compliance monitoring by the Betsy Lehman Center for Patient Safety and Medical Error Reduction. DHCQ is responsible for collecting nurse staffing plans from hospitals, randomly auditing some proportion of these plans, and writing regulations relating to these functions. The Lehman Center is tasked with monitoring nurse-sensitive quality of care indicators, in order to establish and track over time empirical measures relating nurse staffing to health care quality.

Costs to DHCQ

Quoting again from the DPH document, SB 1260 would require the following additional staff resources:

1. 1 half-time Research Analyst to conduct random audits and to track receipt of plans
2. 1 half-time Clerk to receive and file plans
3. 1 Lawyer to write the implementing regulations.

Using the same assumptions as above, we would expect personnel in categories 1 and 2 to be permanent, while the drafting of the implementing regulations (category 3) would be temporary. Using the HRD starting salary estimates of $39,500 for a Research Analyst and $35,000 for a Clerk, and adding in the cost of benefits, we estimate the first-year costs for these two permanent, part-time positions to be $46,562.50. As before, we will not attempt to estimate the temporary cost of dedicating a staff attorney to writing the regulations. Presumably, this task would be performed by an existing staff member, and we do not know what length of time is required.

Costs to Betsy Lehman Center

SB 1260 would require the Lehman Center to collect and analyze hospital data on nurse-sensitive indicators of quality of care. The Center's responsibilities are to select two quality indicators (from a list developed by the National Quality Forum) to be measured, in addition to nursing Hours Per Patient Day (HPPD), which is a standard

[29] Going forward, salaries for the 7 permanent positions will have to be adjusted for inflation and merit increases; we only estimate the first-year costs here.

measure of nurse staffing. The Center would then need to develop a format for hospitals to report data on the three indicators, collect this data annually, and disseminate it to the public.

The personnel estimate given to us by DPH explicitly separates temporary (start-up) personnel and those needed for ongoing tasks. However, the document anticipates that temporary personnel would be needed for 1 full year at the beginning, so we can estimate the costs for temporary as well as permanent positions. The DPH document lists the following:

Temporary Staffing (first 12 Months):
- One project manager (contractual) – Manager VI level
- One Public Health Nursing Adviser II (contractual)
- One part-time Information Technology/Electronic Data Processor (contractual)
- Part-time administrative support

On-going staff needs:
- Full-time Project Manager
- Part-time Information Technology/Electronic Data Processor
- Part-time Administrative Assistant

Here we can estimate the costs of temporary staff, since DPH anticipates needing such staff for one year. The HRD starting salary estimates for the above job categories are as follows: Project Manager ($57,400), Public Health Nursing Adviser ($53,630), Information Technology/Electronic Data Processor ($63,000), and Administrative Assistant ($34,000). Start-up activities in the first year would require the Lehman Center to dedicate 3 FTEs, at a total cost of $199,412.50, including benefits. Ongoing duties would require 2 FTEs, at $132,375. It is not clear whether the permanent staff would be needed during the start-up year. If so, then the total estimated cost of the Lehman Center's duties under SB 1260 would be $331,787.50 during the first year, then would drop to $132,375 in the following year.

These costs for the Lehman Center could potentially be offset by a new revenue source. SB 1260 specifies that any monetary penalties levied against hospitals for failing to file nurse staffing plans with DPH will go to the Center. However, the bill does not specify the size of such penalties, nor does it explicitly require that monetary penalties be applied. Therefore, this cannot be considered a truly dedicated source of funding.

Summary of public agency cost estimates

Both HB 2663 and SB 1260 would create significant new responsibilities for the Department of Public Health (DPH). In this section, we have presented estimates of the potential costs to public agencies of both bills. These estimates are conservative, because they refer only to personnel costs. Overhead costs, such as office space and equipment, are not considered here. Neither bill provides specific, dedicated funding to

pay for these responsibilities, though SB 1260 could potentially provide some funding, by transferring funds from (unspecified) financial penalties paid by hospitals found in noncompliance with the bill's provisions to the Betsy Lehman Center.

Table 4 summarizes the potential costs of both bills. Further discussion of the impact of both bills on public agencies will be presented in the section on policy implications, at the end of this report.

Table 4: Potential Costs to Public Agencies of Provisions in HB 2663 and SB 1260

DPH Agencies	House Bill 2663	Senate Bill 1260
Division of Health Care Quality	$389,000 per year, plus start-up costs	$47,000 per year, plus start-up costs
Betsy Lehman Center for Patient Safety and Medical Error Reduction	- 0 -	$332,000 start-up costs, then $132,000 per year

Potential Impact of Educational Provisions in SB 1260 on Nurse Workforce Development

In our analysis of SB 1260's provisions that focus on enhancing nurse workforce development in Massachusetts, we realized it would be prudent to include a short description of the current state of the nursing school enterprise in Massachusetts. We limited the scope of this discussion to those nursing educational programs that prepare students to sit for registered nurse licensure, as well as to those programs granting graduate degrees. Since HB 2663 has no provisions aimed at nurse workforce development, the discussion in this section will focus solely on SB 1260.

Analysis of Massachusetts's nursing education capacity

Massachusetts's nursing shortage

The U.S. Bureau of Labor Statistics has projected that 1.1 million new and replacement nurses will be needed nationwide by 2012. The supply of registered nurses in the U.S. is expected to peak by 2010, though demand will accelerate through 2020. Enhancing the capacity of nursing education programs is regarded as a primary strategy to address the worsening nursing shortage.

Massachusetts had 4,820 nurse vacancies in 2005, representing a 7% vacancy rate in the nurse workforce. By 2010 this shortage will grow to 12%, representing 9,096 nurse vacancies statewide.[30] Approximately half of these vacancies will stem from retiring

[30] U.S. DHHS, HRSA, Bureau of Health Professions, July 2002.

nurses and the other half from increased demand for health care services driven by an aging population.

Nursing schools' capacity

Massachusetts has 40 registered nurse and higher degree nursing education programs with approval from the Massachusetts Board of Registration in Nursing (BRN). Of these, 21 programs offer associate degrees, one (1) program offers a hospital-based diploma, and 18 offer baccalaureate and higher degrees. Among the baccalaureate and higher degree programs, 14 offer master's degree programs and 5 offer a PhD in Nursing. Of note, 6 of the master's degree programs offer a direct-entry masters program, which allows students who already possess a bachelor's in a field other than nursing to graduate with a master's in nursing.

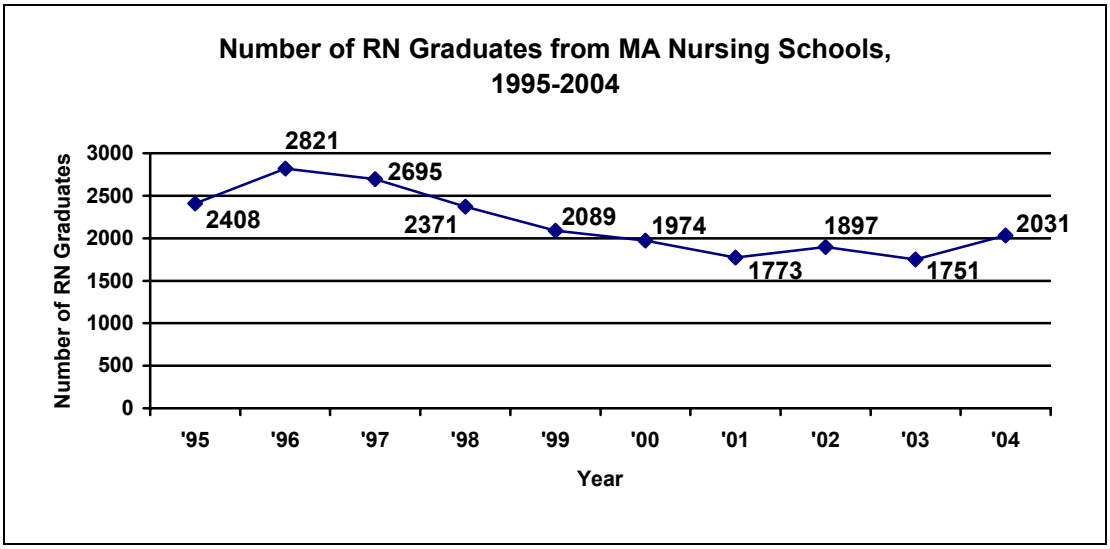
During the past five years, Massachusetts nursing schools have responded to the nursing workforce crisis by using existing resources to garner externally funded grants, to form creative partnerships with clinical agencies, and to develop innovative educational programming. These activities have been focused on increasing the number and graduation rate of students in the four kinds of nursing education programs that allow graduates to sit for initial registered nurse licensure: associate degree, hospital-based diploma, baccalaureate degree, and certificate of completion as part of a direct-entry master's degree program.

Overall, these programs graduated 2,031 nursing students in 2004, an increase of 16% over 2003, but still considerably lower than the 2,821 students who graduated from Massachusetts nursing schools in 1996 (Figure 1). Of the 2,031 graduates in 2004, 660 (36%) graduated from baccalaureate programs and 185 (9%) graduated from direct-master's programs. There were 3,673 students admitted in 2004, an increase of 16% from 2003. Associate degree admissions totaled 1,954 (53%); hospital diploma program admissions totaled 114 (3%); baccalaureate admissions totaled 1,352 (37%); and direct-entry master's admissions totaled 253 (7%) of all nursing school admissions in 2004.[31]

Despite the growth in overall nursing school enrollments for 2004, 78% of Massachusetts RN nursing programs reported that a total of 1,814 qualified nursing applicants were turned away.[32] Over 20% of basic nursing education programs in Massachusetts listed faculty vacancies as the primary reason they were unable to increase enrollments.[33]

[31] Massachusetts Association of Colleges of Nursing. *Ensuring Educated Nursing Workforce for the Commonwealth*, July 2005. Available at: http://www.massnursing.org/MACN_July05.pdf
[32] Massachusetts Board of Registration in Nursing. Available at: http://www.mass.gov/dpl/boards/rn/nedu/neinter.htm
[33] Massachusetts Association of Colleges of Nursing. *Ensuring Educated Nursing Workforce for the Commonwealth*, July 2005. Available at: http://www.massnursing.org/MACN_July05.pdf

Figure 1



Source: Massachusetts Board of Registration in Nursing. Available at: http://www.mass.gov/dpl/boards/rn/nedu/02rnstat/02stat02.htm

Faculty shortages

In the 2005 American Association of Colleges of Nursing (AACN) *Survey on Faculty Vacancies*, 82% of responding nursing schools reported having faculty vacancies or a need for additional faculty.[34] Future faculty availability is impacted by faculty age and retirement timelines combined with noncompetitive faculty salaries and an inadequate pool of younger faculty replacements.

The 2004 Massachusetts Board of Registration in Nursing (BRN) faculty vacancy survey,[35] which had 31 Massachusetts nursing education programs respond, reported a 5% vacancy rate for full-time nurse faculty during the 2003-2004 academic year. Statewide RN programs are projected to have an 8% faculty vacancy rate during the academic year 2005-06, which is the same as the national forecast. Massachusetts nurse faculty shortages contributed to at least 1,814 qualified nursing school applicants being denied admission in 2004.[36]

Different educational programs in nursing require nursing faculty with different educational backgrounds. Four year colleges and university nursing education programs must comply with university standards for doctoral prepared faculty, while community colleges hire predominantly master's prepared nursing faculty. Nursing

[34] Berlin LE, Wilsey S. *2005 Survey on Faculty Vacancies*. American Association of Colleges of Nursing, Washington, DC, 2005.
[35] Massachusetts Board of Registration in Nursing. *Faculty Vacancies Among Board-approved Nursing Education Programs in Massachusetts: Spring 2004 Survey.* Available at: http://www.mass.gov/dpl/boards/rn/nedu/04facvac.pdf
[36] Massachusetts Board of Registration in Nursing. Available at: http://www.mass.gov/dpl/boards/rn/nedu/neinter.htm

accreditation bodies evaluate programs on these program standards. These subtle differences have a major impact on the output of new nurses, given the shortage of doctoral-level faculty and the fact that the average age of new doctoral graduates is above 45 years.

State regulations require nursing faculty to hold at least a master's degree in nursing. With only 13% of Massachusetts's nurses holding master's degrees, nursing schools are struggling to find qualified faculty to teach. Consequently, the BRN has approved a policy for waivers [244 CMR 6.04(2) (b) 3] that allows clinical instructors with only a baccalaureate degree in nursing to teach. In Fiscal Year 2005, 178 waivers were granted,[37] indicative of the difficulties nursing schools are facing as they try to fill faculty vacancies.

Nursing accreditation requirements stipulate that faculty have prior training in the specialty they teach, which further contributes to the faculty shortage. This shortage is particularly evident in hiring faculty with specialty preparation in the areas of pediatrics, obstetrics, operating room, and psychiatric nursing.

Additionally, nursing education programs are required to have nursing faculty present when students are in the clinical setting. State regulations require a minimum faculty-to-student ratio of 1:10 to ensure safe clinical supervision of undergraduate student nurses as they practice in clinical environments. This ratio is a minimum; many clinical agencies require schools of nursing to increase this ratio from 1:10 to 1:6-8 depending on the acuity level of patients on specialty units. As the number of students a faculty member can supervise in the clinical area decreases, the demand for faculty increases.

Faculty vacancies and the lack of qualified faculty are the most limiting factors in building the capacity of nursing education programs. The nursing faculty shortage has created a bottleneck in the nursing workforce pipeline, thereby restricting nursing schools from admitting more nursing students.

Faculty salaries

The 2004 BRN faculty vacancy survey indicates that nurse faculty salaries significantly affect faculty recruitment efforts. Most baccalaureate and higher degree nursing schools employed fewer full-time employees (FTEs) and had more FTE vacancies in 2004 than in 2002. Nursing programs are required by BRN to not fall below a 1:10 faculty-to-student ratio. Thus, this has caused schools to rely increasingly on BRN's waiver policy for faculty instructors and on part-time clinical instructors to meet this standard.

Nurse faculty salaries are on average 17% lower[38] than the average Massachusetts nurse practitioner salary and are equivalent to the average RN salary in Massachusetts

[37] Board of Registration in Nursing, *Fiscal Year 2005 244 CMR 6.00 Activities Summary*. Available at: http://www.mass.gov/dpl/boards/rn/nedu/necfy05.pdf

[38] $62,360 is the weighted mean of the salaries for master's and doctoral prepared faculty across all ranks as listed in Table 4.

(Tables 5 and 6). The American Association of Colleges of Nursing (AACN) has suggested that salary might be a factor for nurses with graduate education deciding against employment in academia.[39]

Table 5: Full-Time Nurse Faculty Salaries

Master's Prepared Nurse Faculty	Doctoral Prepared Nurse Faculty
Instructor $47,928	Instructor $54,393
Assistant Professor $53,540	Assistant Professor $58,937
Associate Professor $59,007	Associate Professor $68,778
Professor $85,474	Professor $87,953

Table 6: Non-Academic Nursing Salaries

Registered Nurse	Graduate Prepared Clinical/Administrative Nursing Positions
Non-Master's Degree $62,490	Nurse Practitioner $75,043
	Nursing Director $102,592
	Nurse Anesthetist $131,007
	Nurse Executive $164,589

Sources: AACN. 2004-05 Salaries of Instructional and Administrative Nursing Faculty in Baccalaureate and Graduate Programs in Nursing. Wash., D.C., 2005, p.18; Salary.com (August 2005). Available at: http://swz.salary.com/salarywizard/layouthtmls/swzl_narrowbrief_HC05.html

Provisions of SB 1260 that address nurse workforce development

SB 1260 has 5 provisions regarding nurse workforce development:

1. Conduct an analysis of workforce and faculty resources.
2. Develop a statewide plan to promote health care professions to the general public.
3. Have agencies that collect nursing workforce data submit their information to the Massachusetts Center for Nursing, Inc.
4. Address the retirement of nursing faculty from Massachusetts public institutions due to the Early Retirement Incentive Program, which was implemented in the first half of FY 2002, and require said faculty positions to be termed "critical and essential". In essence this provision would provide for the continued funding of these nurse faculty lines at public nursing schools by amending Section 616 of Chapter 26 of the Acts of 2003 (Massachusetts General Court Session Laws). It is not clear if this provision would be retroactive to 2003.
5. Set aside $30,000,000 to establish the Clara Barton Nursing Excellence Trust Fund. This will fund:

[39] AACN. Faculty shortages in baccalaureate and graduate nursing programs: Scope of the problem and strategies for expanding the supply. Washington, DC. 2003.

- Student loan repayments: $200/month x 48 months maximum = $9,600 per qualified nurse or nurse instructor not to exceed two years.
- Expert nursing corps program: $5,000/year x 10 years maximum = $50,000 per qualified expert nurse awarded over ten years, plus additional reimbursement for American Nurses Credentialing Center certification. Expert nurses will serve as mentors for incoming or novice nurses.
- Nursing school scholarships: $3,500/semester maximum per recipient, plus an optional housing voucher of $200/month maximum.
- Institutional grants for the purpose of: 1) fostering partnerships between higher education institutions and clinical agencies that promote the recruitment and retention of nurses; 2) establishing and maintaining nurse mentoring or nursing internship programs.
- Matching grants to hospitals that commit resources or personnel to nurse education programs. This would be a dollar-for-dollar match for any funds committed by hospitals that pay for nurse faculty positions in publicly funded schools of nursing.

Estimated impact of the $30 million Clara Barton Nursing Excellence Trust Fund on nurse workforce development

Assumption: $30 million trust fund at 5% growth rate = $1.5 million/year to fund the aforementioned Clara Barton Nursing Excellence Trust Fund provisions.

How many nursing students can be supported by a $1.5 million yearly allotment? Using the Massachusetts Board of Registration in Nursing (BRN) figure of 1,814 qualified nursing school applicants that were denied admission in 2004,[40] divide $1.5 million by 1,814 potential students, which equals $827 in financial assistance per student per year. This would represent the maximum allotment per student if no other provisions were funded from the Clara Barton Nursing Excellence Trust Fund. Not only does this represent a low figure for financial assistance, but nursing schools have reported being unable to expand enrollments due to faculty shortages. Thus, the true core of the problem that needs to be addressed is not the pool of potential nursing students, but the faculty shortage.

The expert nursing corps provision of the trust fund sounds promising, but how many mentors will it fund? If we assume that each mentor could take responsibility for two incoming or novice nurses, the program would need at least 1,000 mentors each year (since Massachusetts graduated over 2000 nursing students in 2004). With salary bonuses of $5,000 per year given to members of the expert nursing corps, the cost of providing a mentor for all new nursing graduates would be $5 million, more than triple the yearly income from the trust fund.

[40] Available at: http://www.mass.gov/dpl/boards/rn/nedu/neinter.htm

The Clara Barton Nursing Excellence Trust Fund is an ambitious part of SB 1260. However, as our analysis indicates, it may be under funded relative to the number of programs it is intended to support.

Projected cost of addressing the nursing education bottleneck in nursing schools

It is a shortage of faculty and nursing school resources, not of potential students, that is contributing to the nursing shortage. Although a $30 million trust fund to fund nurse workforce development is a meaningful step, it is important to put that figure in perspective relative to the nursing shortage and the insufficient nursing school capacity in Massachusetts. Therefore, we asked the question:

> At what enrollment capacity would Massachusetts's nursing schools be able to overtake the 9,096 nurse vacancies projected for 2010?

As noted above, Massachusetts nursing schools reported to the BRN that at least 1,814 qualified nursing applicants were turned away in 2004.[41] Assuming that Massachusetts RN nursing schools could admit and graduate that many more students per year for the years 2006-2010, the total over these 5 years would be an additional 9,070 graduates. This would almost make up for the projected 2010 shortage of 9,096 vacancies.

Adding over 1,800 students per year to nursing school enrollments would require an additional 180 nurse faculty, given the BRN's mandated faculty-student ratio of 10:1. With 178 faculty waivers granted in FY 2005, and 42 faculty vacancies projected for the 2005-06 academic year, nursing schools would need to hire 400 full-time faculty members to meet an expanded enrollment of 1,800 students. Using $62,360 as the average full-time nurse faculty salary,[42] nursing schools would need almost $25 million to cover these full-time nurse faculty salaries. Furthermore, with nursing schools already struggling to fill faculty vacancies with qualified instructors, it is doubtful that 400 qualified full-time faculty could be found, especially since faculty salaries are already lower on average than salaries for graduate-level nurse practitioners, directors, and executives (see Tables 5 and 6). Finally, this estimate of the cost of expanding nursing school enrollments does not take into consideration the added costs of enlarging lab facilities and classroom space, developing additional clinical resources, and adding support staff to assist in program operations.

[41] Massachusetts Board of Registration in Nursing. Available at: http://www.mass.gov/dpl/boards/rn/nedu/neinter.htm

[42] AACN. 2005. Salaries of Instructional and Administrative Nursing Faculty in Baccalaureate and Graduate Programs in Nursing. Washington, D.C., p.18. $62,360 is the mean of the salaries for master's and doctoral prepared faculty across all ranks as listed in Table 11.

Summary of the potential impact of SB 1260's educational provisions on nurse workforce development

Using the interest income from a $30 million trust fund to increase student enrollments at nursing schools is not a sufficient solution to the growing nursing shortage. Our analysis indicates a lack of nursing school capacity, including faculty, as opposed to a lack of interested students, as being the primary obstacle to increasing the supply of nurses. It would take a sum approaching $30 million, rather than the interest gained from a $30 million trust fund, to address the nursing shortage. As currently envisioned in SB 1260, the Clara Barton Nursing Excellence Trust Fund, however well-intentioned, would not significantly offset the worsening nurse shortage in Massachusetts, nor would it allow significantly more students to enter nursing school. The true target should be expanding the capacity of nursing schools, with an emphasis on attracting and retaining nurse faculty.

Economic and Policy Implications of Both Bills for Hospitals and Public Agencies

For either bill to succeed in the stated objectives of improving patient safety, quality of care, and nurses' working conditions, the number of nurses working in Massachusetts hospitals will likely need to increase. Any increase in nurse staffing will result in higher costs to hospitals. These costs in turn will be passed along to the public through increases in hospital charges, insurance premiums, and taxpayer costs (for publicly provided health care).

Estimating the magnitude of these potential cost increases is difficult. No such estimate can be produced for SB 1260, since it does not propose any specific minimum nurse-to-patient ratios. Since HB 2663 does have specific ratios, we can estimate the costs, given sufficient data, and we have done so in this report. Because there is no systematic statewide source of data on hospital nurse staffing by unit, we collected data from a sample group of hospitals. The general hospitals in our sample group were only able to supply data at the necessary level of detail for certain units,[43] so the cost estimates presented above give only a partial picture of the financial impact on these hospitals.[44]

We will discuss three key points relating to costs and access to care in this section: potential economic impact on hospitals, costs to public agencies, and possible effects on the nursing labor market and access to care.

[43] The two specialty hospitals in the sample group were able to give complete data, since they are not divided into distinct units.

[44] It is also theoretically possible to calculate the potential benefits of higher nurse staffing, in terms of reduced patient complications, shorter lengths of stay, and the like, but such an analysis is considerably more complex, and outside of the scope of this report.

Potential economic impact on hospitals

Potential risks/concerns under HB 2663

Every hospital in our sample group would have felt at least some economic impact had the proposed minimum ratios in HB 2663 been in effect during fiscal year 2004 (the period for which we have data). The scale of this potential impact, however, would have been quite variable. Certain hospitals would have incurred costs that, while substantial, would likely have been financially manageable, but others would have faced very large cost increases, on a scale that could have put their continued financial viability at risk. Again, the cost estimates in this report only refer to HB 2663, since SB 1260 does not propose specific nurse-to-patient ratios. Hospital nurse staffing could increase under SB 1260 as well, but there is no guarantee this would happen, and it would be impossible to estimate the size of any such increase.

The most important finding of our analysis is that the proposed minimum ratios in HB 2663 would have vastly different effects, depending on the type of hospital. While our analysis of nurse staffing data from a sample group of hospitals is not meant to serve as a projection of total costs in hospitals statewide, we do believe that the hospitals in our sample group are broadly representative of other hospitals of the same type. However, because our study is not a random sample of hospital units, the findings cannot be generalized.

The one state-owned (Department of Public Health) hospital, and the two freestanding specialty (psychiatric and rehabilitation) hospitals in our sample group would have sustained the most serious financial impact by far, had HB 2663 been in effect during fiscal year 2004. The state hospital would have had to increase its registered nurse budget by 208% for the units we analyzed to have met the proposed minimum ratios. The psychiatric and rehabilitation hospitals would have had to increase their nurse payrolls by 157% and 86%, respectively; these two estimates are for the hospitals as a whole, since they are not divided into separate units.

In the case of the state-owned hospital (Hospital E), it is likely that the large nursing shortfall results from funding shortfalls, which are endemic to the public hospital sector. In addition, it may be the case (though we do not know this) that the acute care patient population in this and other state-owned hospitals has a lower average acuity than patients at other facilities, such as teaching hospitals, and thus would require fewer nursing staff. Regardless, this hospital would have been required to more than triple its nurse payroll in the units we analyzed had HB 2663 been in effect. To a large extent, state hospitals are exempt from the financial imperatives of private hospitals: they are by their nature expected to be money-losing enterprises, since they serve a vulnerable, primarily uninsured, population. Nonetheless, the financial impact of mandatory minimum staffing ratios on state-owned hospitals is a serious issue, since taxpayers as a whole are the payers in this health care sector.

By contrast, the large nursing shortfalls in the two specialty hospitals (Hospitals F and G) stem from a mismatch between the provisions of HB 2663 and the model of care in these two facilities. Both psychiatric and rehabilitation facilities (and such units within general hospitals) have models of care that do not require the same nurse staffing levels around the clock. Whereas an intensive care unit, for example, would generally need to be staffed equally on all shifts, psychiatric and rehabilitation therapies are delivered to patients during day and evening hours. Of course, adequate nurse staffing must be maintained overnight, in case of psychiatric or medical emergencies, but the expectation that the same staffing levels would be used on overnight shifts as during day and evening shifts is not consistent with clinical practice in these areas. Another important difference in the models of care at psychiatric and rehabilitation facilities is that both require a different skill mix than in physical care settings. Inpatient psychiatric treatment requires more mental health workers, social workers, and other non-RN staff, while rehabilitation care makes extensive use of physical therapists and personal care attendants.

The two general acute care hospitals outside of the Boston metropolitan area would have been strongly affected by HB 2663 as well, although not to such a large extent as the hospitals just discussed. The teaching hospital (Hospital H) would have needed to increase its RN budget by 21.3% in the units we analyzed, while the community hospital in rural western Massachusetts (Hospital I) would have required a 17% increase.[45] The shortfalls in these two hospitals may reflect budgetary restraints and difficulties in recruiting nurses in these areas.

The four hospitals in Boston and its surrounding suburban areas would have felt the least impact from the proposed minimum ratios in fiscal 2004, at least in the units for which we received usable data. The two suburban community hospitals (Hospitals A and B) would have had to raise their nursing payrolls by 7.1%[46] and 4.1%, while the two Boston-based teaching hospitals (Hospitals C and D) would have required increases of 2.7% and 5.7% in the units we analyzed. Interestingly, these four hospitals were already staffing many of their units well above the minimum ratios proposed by HB 2663.

The calculation of additional nurse staffing costs in Emergency Departments (EDs) proved particularly difficult, because of a lack of clarity in the language of HB 2663 as to which nurse-to-patient ratio would actually apply to EDs. Our analysis assumed that the intermediate, 1:2 nurse-to-patient ratio would apply to the EDs in our sample group of hospitals. If a hospital's ED patient mix leans towards greater acuity, as would likely be the case in urban and teaching hospitals, then the ED would need to move closer to a 1:1 ratio. The nursing shortfalls we observed in several EDs would therefore worsen.

HB 2663 could impose other costs on hospitals that we are unable to estimate here. First, nurse wages may be driven up by higher demand that results from the proposed mandatory minimum ratios. This would entail higher costs both for newly hired nurses and for currently employed nurses, since hospitals would have to raise pay across the

[45] Neither percentage includes the additional cost of the nursing management positions.
[46] This percentage does not include the nursing management positions.

board to retain nurses. Second, HB 2663's prohibition of mandatory overtime could increase overall nurse staffing expenses for some hospitals, if any are now routinely requiring nurses to work overtime. Such hospitals would have to increase their total number of individual RNs employed beyond the levels they might otherwise set (because each RN could work fewer hours). Third, we are unable to estimate the cost of putting in place new Patient Classification Systems (PCSs) at each hospital in the state. While many hospitals already have PCSs, they may have to change to a different system, depending on what system the Department of Public Health selects for use statewide. Hospitals that currently do not use a PCS will have to create the electronic information infrastructure necessary to implement one.

Finally, we stress again that our estimates of the costs of increased nurse staffing are conservative. None of the hospitals in our sample group were able to provide data at the needed level of detail for all of their units. Depending on staffing and utilization patterns in units we could not include in the analysis, additional nursing resources, and hence further cost increases, may be needed to comply with the proposed ratios. Any additional nursing costs would further worsen hospital financial margins, since they would decrease the nominal value of any financial surplus (or increase any deficit). Another source of underestimation is our decision to use the intermediate 1:2 ratio as the benchmark for Emergency Departments (EDs), as discussed above. A third reason to consider our analysis an underestimate is that it is based on 2004 data. Because market forces and collective bargaining agreements have in recent years led to annual nursing wage increases well in excess of inflation, the additional nurse staffing costs could be greater in the year of HB 2663's implementation, and greater still in subsequent years. A fourth factor is that our analysis is not able to determine nurse staffing ratios for each separate shift on the units we analyzed. Because the proposed minimum ratios would apply around the clock, some hospital units may be understaffed on overnight shifts, even if their average staffing ratios exceed the minimum. Finally, our estimates of nurse staffing shortfalls use only the minimum acceptable nurse-to-patient ratios as benchmarks: hospitals would be required to maintain still higher ratios if their PCS indicates the need.

Potential benefits under HB 2663

The increased costs of nurse staffing could be offset in part, or entirely, by improvements in quality of care that would result. Because richer nurse staffing is associated with fewer complications, adverse events, and medical errors, and with shorter hospital stays, there is even the potential for overall cost savings (though such savings would accrue mainly to payers rather than to hospitals). We cannot test this possibility here, but it should be considered. Even if cost offsets do not cover the cost of increased nurse staffing, the improvements in patient safety and outcomes may justify the added expense at the level of the health care system as a whole.[47]

[47] Rothberg MB, Abraham I, Lindenauer PK, Rose DN. Improving Nurse-to-Patient Staffing Ratios as a Cost Effective Safety Intervention. *Medical Care.* 2005; 43 (8): 785-91.

Potential benefits, risks, and concerns under SB 1260

We cannot independently evaluate the costs and benefits of SB 1260, because we cannot estimate the extent to which particular hospital units might have to increase their RN staffing as a result of SB 1260. To the extent that nurse staffing levels were to rise under SB 1260, the calculation of costs, benefits, and risks would be the same as under HB 2663. There is no guarantee, however, that nurse staffing levels would increase under SB 1260.

Costs to public agencies

Potential risks/concerns under HB 2663 and SB 1260

Both HB 2663 and SB 1260 would require public agencies to take part in developing standards for measuring the adequacy of nurse staffing, and in monitoring and enforcing hospital compliance with these standards. These responsibilities will have financial costs that ultimately must be borne by taxpayers. For the most part, dedicated funding streams have not been created to cover the costs to public agencies.

HB 2663 requires the Department of Public Health (DPH) to develop a standardized acuity-based Patient Classification System (PCS) for use statewide, to collect and monitor hospital nurse staffing plans based on this PCS, and to enforce compliance with these plans. Based on information provided to us by DPH, we estimate that the total ongoing cost to DPH of monitoring and enforcing hospital compliance with HB 2663 would be $388,625 per year. This figure does not include one-time start-up costs, and does not account for inflation over time. Therefore, the true cost to DPH would be higher than this, but the lower estimate is the only one we can make with any precision.

SB 1260 requires DPH to collect and randomly audit hospital nurse staffing plans, though it does not give DPH responsibility for developing the PCS to be used by hospitals. In addition, the Betsy Lehman Center, which is part of DPH, is responsible for monitoring nurse-sensitive quality of care indicators in the state's hospitals, so that empirical measures relating nurse staffing to health care quality can be tracked. The combined ongoing costs to these two units within DPH would be at least $178,937 per year. Again, this excludes initial start-up costs, which could push first-year costs to more than twice that amount.

Neither bill creates a dedicated source of funding for these responsibilities. SB 1260 does stipulate that any fines collected from hospitals that are found to be in violation of the bill's provisions will be transferred to the Betsy Lehman Center; this could help offset the Center's costs. However, the bill does not define the size of fines for violations, nor does it require that monetary penalties be levied at all. As a result, this cannot truly be considered a dedicated funding stream. HB 2663 does not contain any provisions for potential funding for public agencies to carry out their increased responsibilities.

Potential benefits under HB 2663 and SB 1260

Both bills, if passed, could increase the capacities of DPH as the Commonwealth's primary hospital regulator, empowering the department to better monitor the performance of hospitals, and, by extension, to help protect the health of Massachusetts's citizens.

Possible effects on the nursing labor market and access to care

While we can to some extent estimate the potential financial impacts of these two bills on hospitals and public agencies, it is beyond the scope of this report to attempt to quantify the possible effects of either bill on the nursing labor market and on access to care. Nevertheless, these two topics are important, and deserve discussion, even if that discussion can only be at a theoretical level.

Potential risks/concerns under HB 2663 and SB 1260

To the extent that HB 2663 and SB 1260 would require hospitals to increase their nurse staffing, both bills have implications for the nursing labor market. Given the prevailing shortages in the supply of nurses, increased demand for nurses by Massachusetts hospitals in response to either bill's passage could drive wages for nurses higher in the Commonwealth. This would further increase the costs imposed on hospitals and, ultimately, the people themselves, in their roles as health care consumers and taxpayers. Generally, market forces attract new entrants to a profession that is in high demand, and to some extent, that is occurring with respect to nursing. However, as discussed elsewhere in this report, bottlenecks have formed in the educational system, with the result that Massachusetts is unable to produce enough new nurses, despite increasing interest among students in recent years.

This suggests the possibility that some hospitals may simply be unable to hire enough nurses to meet the proposed minimum nurse staffing ratios in HB 2663. SB 1260 could also create the same situation, depending on the levels of staffing that would be required under hospitals' patient acuity-based nurse staffing plans. In either case, if hospitals are unable to comply with the law, they may have to close some beds, or perhaps entire units. In extreme cases, facilities may even close altogether; the two specialty facilities (one psychiatric and one rehabilitation) whose nurse staffing data we analyzed above could fall into this category. Such outcomes would obviously result in reduced access to care. Moreover, the potential for reduced access to care falls disproportionately on certain types of health care consumers: those who rely on state hospitals, those who use inpatient psychiatric or rehabilitation facilities, and those who receive acute medical services from hospitals in central and western Massachusetts. Such reductions in access to care could occur under either bill, but since SB 1260 does not propose specific nurse staffing ratios, the likelihood of access problems under that bill is impossible to predict.

Another possibility is that hospitals would obtain additional RNs by hiring them away from other health care settings, such as nursing homes and home health care agencies. In this scenario, hospitals could find enough additional nursing staff to avoid bed or unit closures, but only at the cost of reducing access to nursing home and home health care. Again, this could happen under either bill, but there is no way to estimate the possibility for SB 1260.

Potential benefits under HB 2663

If HB 2663 leads to increased wages for nurses, then obviously nurses, as individuals, will benefit immediately. Over the longer term, higher pay should result in greater interest in entering the nursing profession. But for this greater interest to translate into more actual nurses, the bottlenecks in the nursing education system—serious shortages of nursing faculty and clinical facilities—must be eliminated.

Potential benefits under SB 1260

As discussed previously, SB 1260 does not mandate specific nurse staffing ratios, but, depending on how it is implemented if passed, may result in higher staffing levels. If this were to occur, SB 1260 would have the same beneficial effects on the nursing labor market as HB 2663: increased wages, which would then attract potential new entrants to the profession. Unlike HB 2663, SB 1260 addresses some of the root causes of the nursing shortage, by establishing a $30 million trust fund to support nursing education in Massachusetts. SB 1260's provisions supporting nursing education should begin to help remove the bottlenecks in the system, though more resources will be needed, as discussed previously.

Summary of economic and policy implications for hospitals and public agencies

Both HB 2663 and SB 1260 would impose costs on hospitals and public agencies. Because of data limitations, it was possible only to partially estimate the potential costs for specific units at individual hospitals, and we could do this only for HB 2663, since SB 1260 does not propose specific minimum nurse-to-patient ratios. Our analysis of nurse staffing and patient utilization data provided by a sample group of hospitals found that HB 2663 could have serious financial impacts on certain types of hospitals: the state-owned (DPH) hospital, and the psychiatric and rehabilitation facilities in our sample group, would each face very large increases in nurse staffing costs if required to meet the proposed minimum ratios. General acute care hospitals outside the Boston metropolitan area could face significant (though less serious) cost increases as well. Our analysis did find that Boston-based and suburban hospitals would be far less affected, as they already staff above the proposed minimum ratios in many units. (Because of our assumption of non-transferability of nurses between units, however, our analysis still finds that all of these hospitals would incur some additional costs under HB 2663.)

We were able to produce much more complete estimates of the potential costs to public agencies, based on information from the Department of Public Health (DPH). Both HB 2663 and SB 1260 create new responsibilities for various units within DPH, such as preparation of new regulations, supervision of hospital Patient Classification Systems (PCSs) or nurse staffing plans, and ongoing monitoring and enforcement of both bills' provisions. The overall costs would not be negligible under either bill, though in the context of the entire state budget, the costs would be fairly small. Reliable, specific, and dedicated sources of funding should be provided to cover the costs of these new DPH responsibilities; neither bill does this at present.

Finally, both bills could have very large impacts on the nursing labor market. The mandatory minimum staffing ratios proposed under HB 2663 could seriously exacerbate the already existing nursing shortage. To the extent (not currently known) that it would also require hospitals to increase their nurse staffing, SB 1260 could have the same effect. Serious, ongoing efforts to increase the capacity of the nursing education system—as discussed in next section of this report—must be made if Massachusetts is to ensure delivery of high quality health care to its citizens.

Policy Implications of SB 1260 for Nursing Education and Workforce Development

The $30 million Clara Barton Nursing Excellence Trust Fund is an attempt to support nursing education in Massachusetts. However, our analysis shows that Massachusetts's nursing schools lack the capacity to admit more students, of which 1,814 qualified candidates were turned away in 2004. Furthermore, the yearly interest income of the trust fund does not appear to be enough to adequately fund the programs aimed at nurse workforce development.

Funding a student loan repayment program and a nursing school scholarship program, unless targeted at those students intending to become clinical instructors or nursing faculty, would not produce more nurses, given the lack of faculty to teach more students. Our suggestion would be to dedicate the available funds solely to students who are committed to serving as clinical instructors and/or nursing faculty.

We further suggest that the expert nursing corps program's $5,000 reimbursement per mentor be limited to 5 years instead of the10 year maximum. Additionally, this program should be evaluated annually, with some measure of mentor efficacy cited for the $5,000 bonus incentive to be awarded. Accountability would be the key measure on this recommendation.

The institutional and matching grants provided for by the trust fund have the potential to increase the number of clinical facilities and to allow for the hiring of more nurse faculty. We suggest that hospitals be able to use these funds as part of their community benefit allocation so that nursing schools and hospitals can realize a sustainable financial gain from these grants. Of utmost importance, though, is the question of how many matching

grants can be realistically funded by a $30 million trust fund that is also designed to fund nursing scholarships and loans, as well as an expert nursing corps program.

Although SB 1260 does make an effort to address nurse workforce development, it does not adequately address the crux of the problem, which is the nurse faculty shortage. Academic administrators from Massachusetts's nursing education programs reported faculty shortages, low salaries, lack of qualified faculty, insufficient clinical rotation sites, and inadequate lab facilities as being primary reasons for their inability to enlarge their student enrollments.[48] With over 20% of Massachusetts registered nurse education programs unable to increase admissions due to faculty vacancies, we suggest that SB 1260's $30 million Clara Barton Nursing Excellence Trust Fund would be better spent on attracting nurse faculty and enhancing nursing school facilities. In fact, still greater funding is needed to increase nursing school capacity, and thus ultimately increase the supply of practicing nurses. At a minimum, the interest from the trust fund would be better spent on an equity adjustment for nurse faculty salaries. In sum, SB 1260 falls far short of the adequate funding level needed to help solve Massachusetts's looming nursing workforce crisis.

Conclusions

Both HB 2663 and SB 1260 share the goal of ensuring appropriate levels of hospital nurse staffing. The proposed methods of achieving this goal are quite different, however. HB 2663 would require hospitals to maintain specific minimum nurse-to-patient ratios at all times, and to have still higher staffing levels if a need for this is indicated by the hospital's acuity-based Patient Classification System (PCS). SB 1260 does not set any specific minimum ratios, but would require hospitals to set their staffing levels in accordance with nurse staffing plans, based on patient acuity, nursing skill mix, and other factors.

In this concluding section, we present what we feel are the most important points about each bill that legislators and other policy makers should keep in mind as they debate the relative merits of the bills.

HB 2663

Potential costs to hospitals

With respect to estimating the potential costs to hospitals, HB 2663 is the only one of the competing proposals whose impact is even partially quantifiable at the moment. Because the bill proposes specific minimum nurse-to-patient ratios, we were able to calculate the cost of meeting these ratios in certain units at hospitals in our sample group, based on nurse staffing and patient utilization from 2004. As stated previously, these cost estimates are neither comprehensive—they refer only to the hospital units for which we obtained usable data—nor generalizable to the broader population of

[48] Young L. *But Who will Teach Them*, Nursing Career Ladder Initiative (NUCLI), Spring 2003.

hospitals in Massachusetts. Nonetheless, we believe that this cost analysis provides some sense of the potential impact of HB 2663 on hospital finances.

The most important finding to arise from our limited cost analysis is that the proposed minimum staffing ratios would have vastly different effects on different types of health care facilities. Had HB 2663 been in effect in 2004, the two specialty (psychiatric and rehabilitation) hospitals and the one state-owned (Department of Public Health) hospital in our sample group would have been seriously impacted, with very large increases in nursing costs required to meet the proposed ratios. The two general acute care hospitals outside the greater Boston area would also have experienced substantial cost increases, though not to the same extent as the state hospital or the specialty hospitals. The four Boston-area (metro and suburban) hospitals in our sample group, by comparison, would not have had to increase their nurse staffing by much. In fact, most units at these hospitals were already staffed in excess of the proposed ratios.

Further research is needed to pinpoint the precise causes of these differential effects, but two general points stand out. First, HB 2663 does not take into account the varying models of care delivery found in different health care disciplines. Psychiatric and rehabilitation hospitals, and such units within general hospitals, rely heavily on non-RN staff, such as mental health workers and physical therapists, and do not typically deliver the same level of care around-the-clock. As a result, both the proposed minimum ratios for these types of facilities (or units) and the requirement that staffing be uniform across all shifts are inconsistent with current practice in these specialty areas. A second major point is that HB 2663 does not primarily rely on patient acuity to drive nurse staffing decisions. While the bill would require hospitals to use an acuity-based PCS (developed under the supervision of the Department of Public Health, for use statewide), patient acuity measures could only be used to increase nurse staffing levels from the floor set by the proposed minimum staffing ratios. These minimum ratios themselves are not based on measured patient acuity; indeed, as discussed in Part I of this report, the scientific literature has not identified any specific, optimal nurse-to-patient ratios. That patient acuity does not guide the proposed minimum ratios may help explain some of the regional variation in the hospital unit cost estimates: Boston-area general hospitals may have higher-acuity patients, on average, than hospitals in other areas of the state.

Potential costs to public agencies

HB 2663 creates a number of new responsibilities for the Department of Public Health (DPH). While the overall cost of performing these duties would be small in the context of the entire state budget, it is important to note that no source of funding has been established to pay this cost.

Impact on nurse workforce development

HB 2663's proposed minimum staffing ratios would be likely to create significant new demand for RNs. But the bill has no provisions addressing the problem of supply, that is, the ongoing nursing shortage.

Overall assessment

In our view, HB 2663 would establish minimum nurse staffing ratios for specific clinical units that are not supported by existing research. Moreover, these minimum staffing ratios would have vastly different effects, depending on the type and (to a lesser extent) location of the hospital affected. This is evidence that the proposed ratios do not adequately account for hospital-specific characteristics, such as model of care delivery, staff mix, and patient acuity. HB 2663 does not have any provisions for the collection of data on nurse staffing and quality of care. The collection of such data would help researchers and policy makers understand the relationships between the two. Finally, HB 2663 does not address the nursing education and workforce development issue, which is critical to increasing the supply of RNs in Massachusetts, regardless of whether either HB 2663 or SB 1260 is passed.

SB 1260

Potential costs to hospitals

Since SB 1260 does not propose specific minimum staffing ratios, it was impossible for us to construct any cost estimates, as we did for HB 2663. We would presume that nurse staffing levels in some hospital units would rise if SB 1260 became law, but there is no guarantee of this, nor any way to estimate the magnitude of such increases. This uncertainty stems from the chief difference between the two bills: unlike HB 2663, SB 1260 gives hospitals primary responsibility for determining RN staffing levels, based on patient acuity, nursing skill mix, and other factors.

Potential costs to public agencies

SB 1260 also creates a number of new responsibilities for agencies within DPH. While we estimate that the ongoing cost of these duties will be somewhat smaller than under HB 2663, there is a cost nonetheless, and there is no dedicated source of funding to offset the cost.

Impact on nurse workforce development

SB 1260 has a number of provisions addressing the nursing workforce shortage in Massachusetts. It establishes the $30 million Clara Barton Nursing Excellence Trust Fund to help support nursing students and faculty through scholarships, loan repayment assistance, and other programs. While this represents a useful beginning, more needs to be done to address the most important remaining roadblock to relieving the nursing shortage: the shortage of nursing faculty and clinical teaching facilities. Interested and qualified students are currently being turned away from nursing schools in the Commonwealth because of a lack of qualified instructors and insufficient clinical resources.

Overall assessment

In our view, SB 1260's strongest provision is its requirement that every hospital establish nurse staffing plans based on patient acuity, nursing skill mix, and other hospital and unit characteristics. DPH will have responsibility for auditing these plans, and monitoring hospital compliance with them, on an ongoing basis. While the bill could lead to higher nurse staffing levels, there is no guarantee of this. SB 1260 also creates new mechanisms for collecting and analyzing data on nurse sensitive measures of quality of patient care. This will help researchers and policy makers determine the empirical relationships between nurse staffing levels, patient safety, and other quality measures. This knowledge, in turn, may allow researchers to establish a stronger scientific case for specific nurse-to-patient ratios as an evidence-based best practice in health care. Another strength of SB 1260 is that it does attempt to address nurse workforce development, although these efforts need to focus more on increasing the capacity of the nursing education system.